Draft

Radiological Data Evaluation Findings Report for Parcels D-2, UC-1, UC-2, and UC-3 Soil

Former Hunters Point Naval Shipyard
San Francisco, California

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Department of the Navy
Naval Facilities Engineering Command
Base Realignment and Closure
Program Management Office West

Executive Summary

This report summarizes background information and data evaluation activities conducted on the historical radiological data collected by Tetra Tech EC, Inc. (TtEC) at the former Hunters Point Naval Shipyard (HPNS), San Francisco, California, and findings from the evaluation of soil sample data from Parcels D-2, Utility Corridor (UC)-1, UC-2, and UC-3. HPNS is divided into parcels, which are further broken down into subparcels or work areas. Separate reports will be provided for interior building surfaces and for soil collected from other parcels at HPNS. This report is limited to the soil data at Parcels D-2, UC-1, UC-2, and UC-3. Other parcels and HPNS buildings will be addressed in future reports.

Radiological data collection and removal actions have been previously conducted by contractors[1] at these parcels using Department of the Navy (Navy) and regulatory agency-approved plans based on the Historical Radiological Assessment (HRA) (NAVSEA, 2004) and release criteria documented in the Action Memorandum (Navy, 2006), followed by recommendations for radiological release. There have been various concerns raised regarding the integrity of the data collected during the prior radiological investigation and removal actions at HPNS. Specifically, there are allegations of fraudulent representations of data by TtEC.

The first evidence of soil sample data manipulation and falsification is summarized in the Investigation Conclusion, Anomalous Soil Samples report (TtEC, 2014). TtEC conducted an investigation after Radiological Affairs Support Office (RASO) noted that the final systematic soil sample results from a building site survey unit in Parcel E appeared to be representative of two different data populations, indicating that the soil samples had not been collected where they were purported to have been collected. This report concluded that in addition to this survey unit, 15 survey units and 4 trench units in Parcels C and E had a high probability that the soil samples were not representative of the respective survey units. Seven other locations were identified for further evaluation. TtEC concluded that the persons listed as the sample collectors, either by themselves or in conjunction with others, collected soil samples in areas outside the designated survey units. TtEC implemented a series of corrective actions and considered the action items closed, stating that "TtEC had not had a reoccurrence of the type of anomalous soil sample results that led to this investigation, indicating that the corrective actions have addressed the problem." Ultimately, TtEC conducted rework at each of the survey units identified. Subsequently, former workers at HPNS alleged additional and more widespread data manipulation and falsification.

Allegations of soil data manipulation and falsification made by former TtEC workers include the following:

- When sufficiently low levels of contamination were not obtained, soil samples were collected from a different area known to have lower radioactivity, and reported as having come from the location being investigated.
- Samples and analytical results were discarded when the results were above the release criteria.
- Instead of collecting soil samples from locations predetermined to have higher gamma scan readings, samples would be collected from nearby soil and represented as having come from the original location.

[1] This term refers to contractors who performed prior work at HPNS and who do not have any involvement in this evaluation. Further, the references herein to work and actions performed at HPNS by other contractors that are the subject of this evaluation are meant to pertain to prior work, including, but not limited to investigation, data gathering, and remediation. The members of the team conducting this evaluation had no involvement in the prior work of other contractors, and this evaluation relies solely on available information and documentation.

- When sufficiently low levels of contamination were not obtained, soil sample collection sites were moved 5 to 10 feet in another direction and a new sample was obtained. The new sample was represented as having been obtained from the original location.
- Chain-of-custody forms were falsified to support the false sample collection information.
- During the screening of overburden soil, actual towed array speeds were greater than allowed speeds, thereby reducing the probability of radiation detection.
- Handheld detectors were used improperly, which may have led to increasing the detection limit of the scanning devices.
- Onsite soil sample results were reviewed and shipment of samples to the offsite lab was blocked if there was a high chance that the release criteria would be exceeded.

In response to the concerns, the Navy assembled a Technical Team (a group of technical experts) to conduct an evaluation of the previous data in light of the claims made. The Technical Team includes representatives from the Navy, United States Environmental Protection Agency, California Department of Toxic Substances Control, California Department of Public Health, the City of San Francisco, and Oregon State University. An independent, third-party team of nationally recognized experts has been contracted to support the Technical Team and perform the evaluation and confirmation investigation. This team includes Battelle, Cabrera Services, CH2M, Perma-Fix Environmental Services, and SC&A Environmental Services and Consulting. Oak Ridge Associated Universities and Argonne National Laboratory have been contracted to provide independent review of reports.

The objective of this evaluation is to review the historical radiological data collected by TtEC at HPNS, assess the potential for data falsification or manipulation, and recommend follow-up data collection to validate previous decisions regarding the property condition. The evaluation process for soil included developing databases; establishing a list of primary radionuclides to evaluate; running statistical and logic tests to identify inconsistencies in soil data; performing graphical data reviews to identify anomalies or unusual trends; identifying historically significant sites to identify where potential contamination could be present and manipulation or falsification of data could have underestimated site conditions; identifying sites based on allegations; developing a form to standardize the assessment and document the data evaluation results for every survey unit; and conducting and documenting data reviews.

Soil sample data from trench units (excavated areas created during removal of storm drains and sanitary sewer lines) and fill units (excavated material from trench units that was used as backfill) were evaluated. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, recommendations are provided for no further action[2], reanalysis of archived samples, confirmation sampling, or physical inspection of archived samples. These recommendations are defined as follows:

- **No Further Action** – No further evaluation of the data is recommended during this phase of the project as it did not appear that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.
- **Reanalysis of Archived Samples** – Reanalysis of the archived soil samples (samples collected by TtEC that may be available in onsite storage) collected as initial systematic sample data at an offsite laboratory is recommended. The evaluation indicated evidence of potential data manipulation or

[2] No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.

falsification of final systematic sample data. The purpose for the reanalysis is to a) compare the initial systematic sample results to the release criteria to see if the results may reveal that the release criteria were met and remediation was not required[3] even though final systematic sample results were potentially manipulated and falsified, or b) provide offsite laboratory results to document current site conditions.

- **Confirmation Sampling** – Collection of additional data (surveys, scans, or soil samples) is recommended during this phase of the project. The evaluation indicated evidence of potential data manipulation or falsification based upon the methods used to review the data. The available data are suspect and additional data are needed to document current site conditions. Task-specific plans will be provided detailing the extent of the confirmation sampling activities.
- **Physical Inspection of Archived Samples** – Physical inspection of archived soil samples (samples collected by TtEC that may be available in onsite storage) is recommended during this phase of the project. The evaluation indicated evidence of potential data manipulation or falsification based upon the methods used to review the data. The purpose of the physical inspection of the samples is to determine whether the physical soil characteristics are what would be expected given the sample's collection location. This comparison will help determine whether data have been manipulated or falsified.

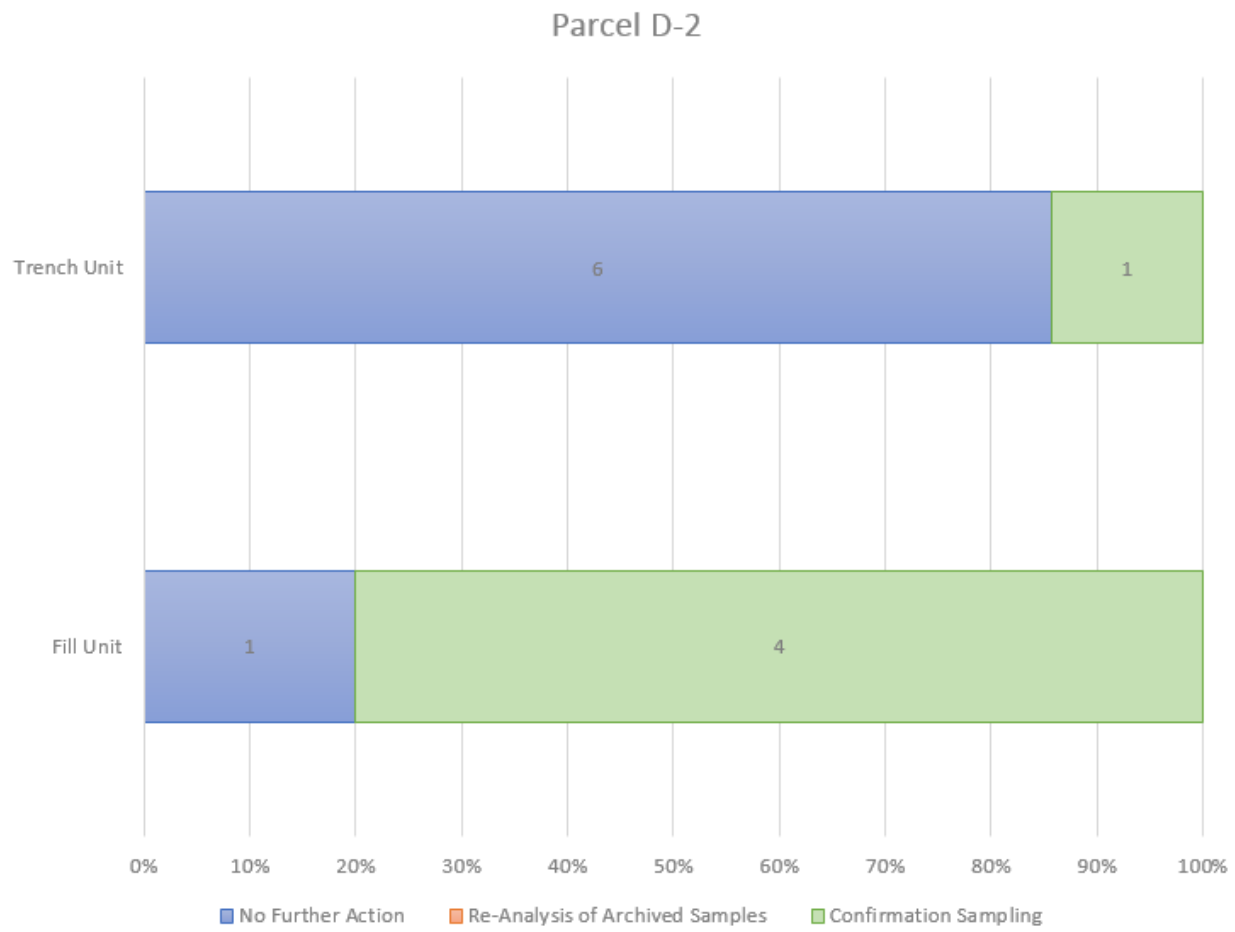
The following sections summarize the findings and recommendations of the soil data evaluation for Parcels D-2, UC-1, UC-2, and UC-3.

Parcel D-2

The areas evaluated in Parcel D-2 included seven trench units and five fill units. More than 400 soil samples were collected from these areas from 2006 through 2009. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

- Trench units - There was no evidence of potential data manipulation or falsification identified at six of the seven trench units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining trench unit, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at one of the five fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining four fill units used as backfill for four trench survey units, and confirmation sampling is recommended. Of the four fill units, four were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements.

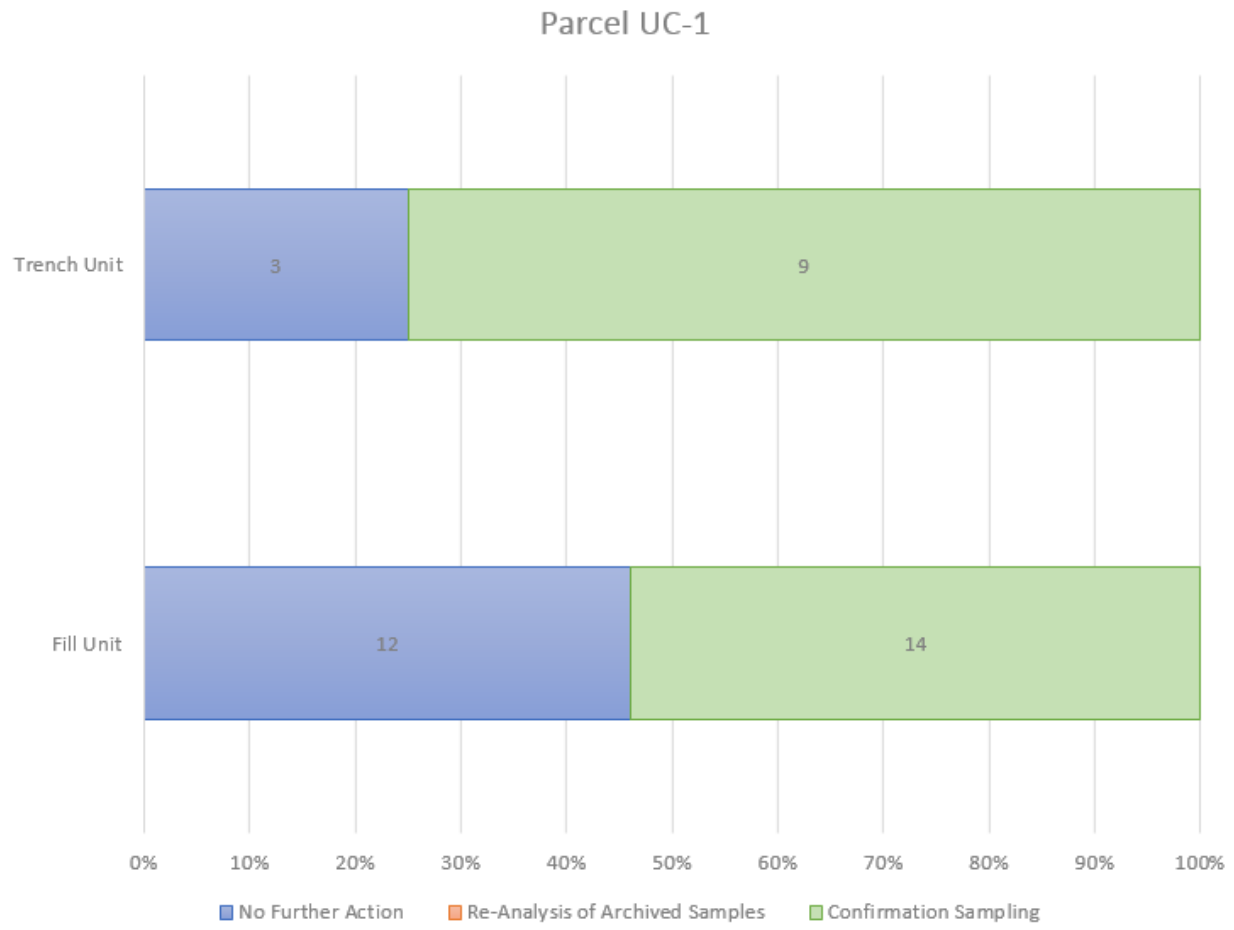
[3] Ra-226 results were reported by the onsite laboratory using a screening method based on the 186 keV energy peak. The offsite laboratory analyzed Ra-226 using a definitive method, allowing the soil samples to equilibrate (21-day in-growth) and reported concentrations using the 609 keV energy peak for Bi-214. Comparisons between the onsite laboratory screening results and the offsite laboratory definitive results for Ra-226 demonstrate the onsite laboratory results were consistently biased high. The Ra-226 analytical results from the onsite laboratory resulted in false exceedances of the release criteria, which resulted in the initiation of remediation. Remediation may have been avoided had soil samples been allowed to equilibrate (21-day in-growth) and decisions had been based on the more reliable Bi-214 analysis using the 609 keV energy peak. The screening method used by the onsite laboratory was selected to allow for rapid decision making during field investigations and to prevent health and safety concerns associated with large open excavations.



Parcel UC-1

The areas evaluated in Parcel UC-1 included 12 trench units and 25 fill units. More than 1,600 soil samples were collected from these areas from 2009 through 2010. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

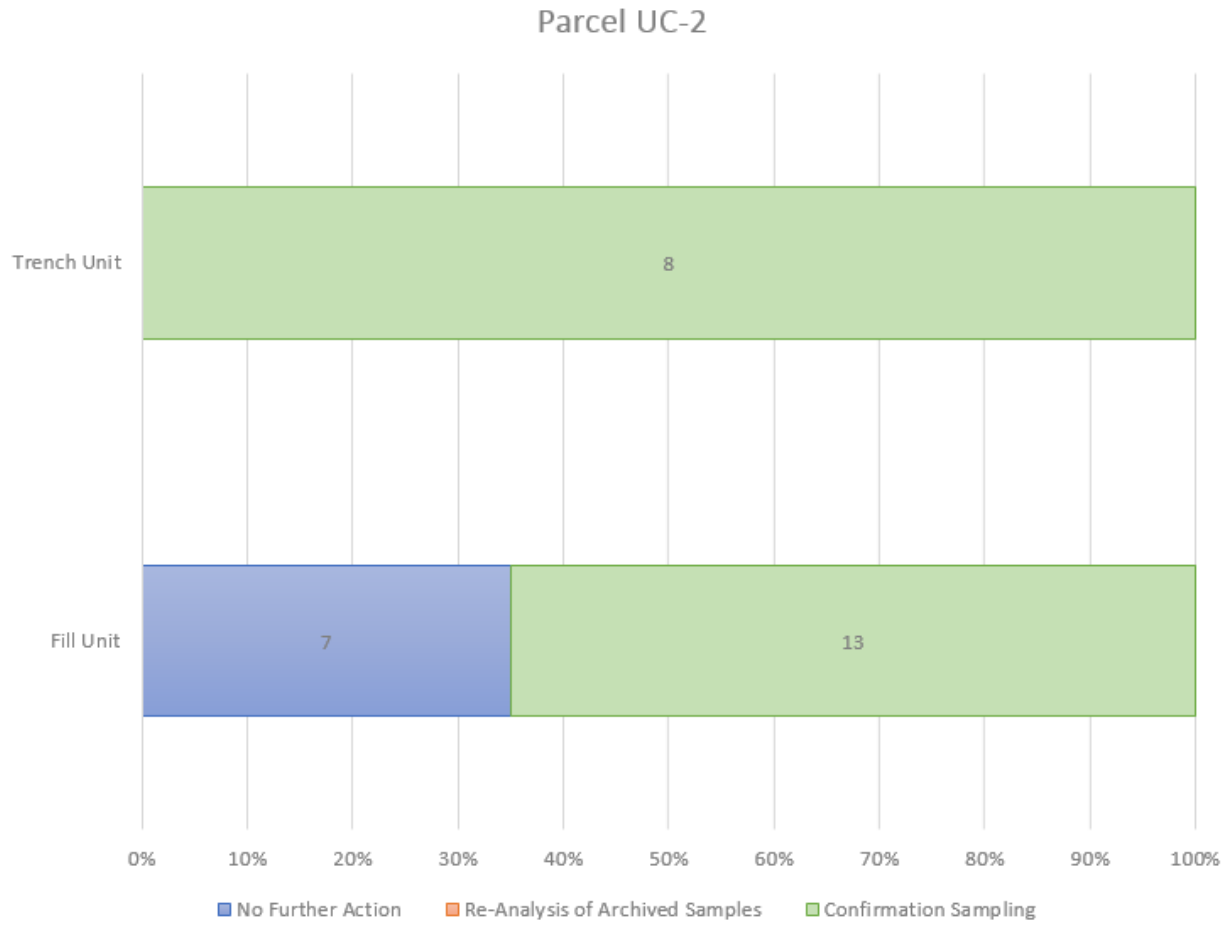
- Trench units - There was no evidence of potential data manipulation or falsification identified at 3 of the 12 trench units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining nine trench units, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at 12 of the 26 fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining 14 fill units used as backfill for 8 trench survey units, and confirmation sampling is recommended. Of the 14 fill units, 14 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 1 of the 14 fill units recommended for confirmation sampling had other inconsistencies and unusual findings reported during the evaluation.



Parcel UC-2

The areas evaluated in Parcel UC-2 included 8 trench units and 20 fill units. More than 1,000 soil samples were collected from these areas in 2009. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

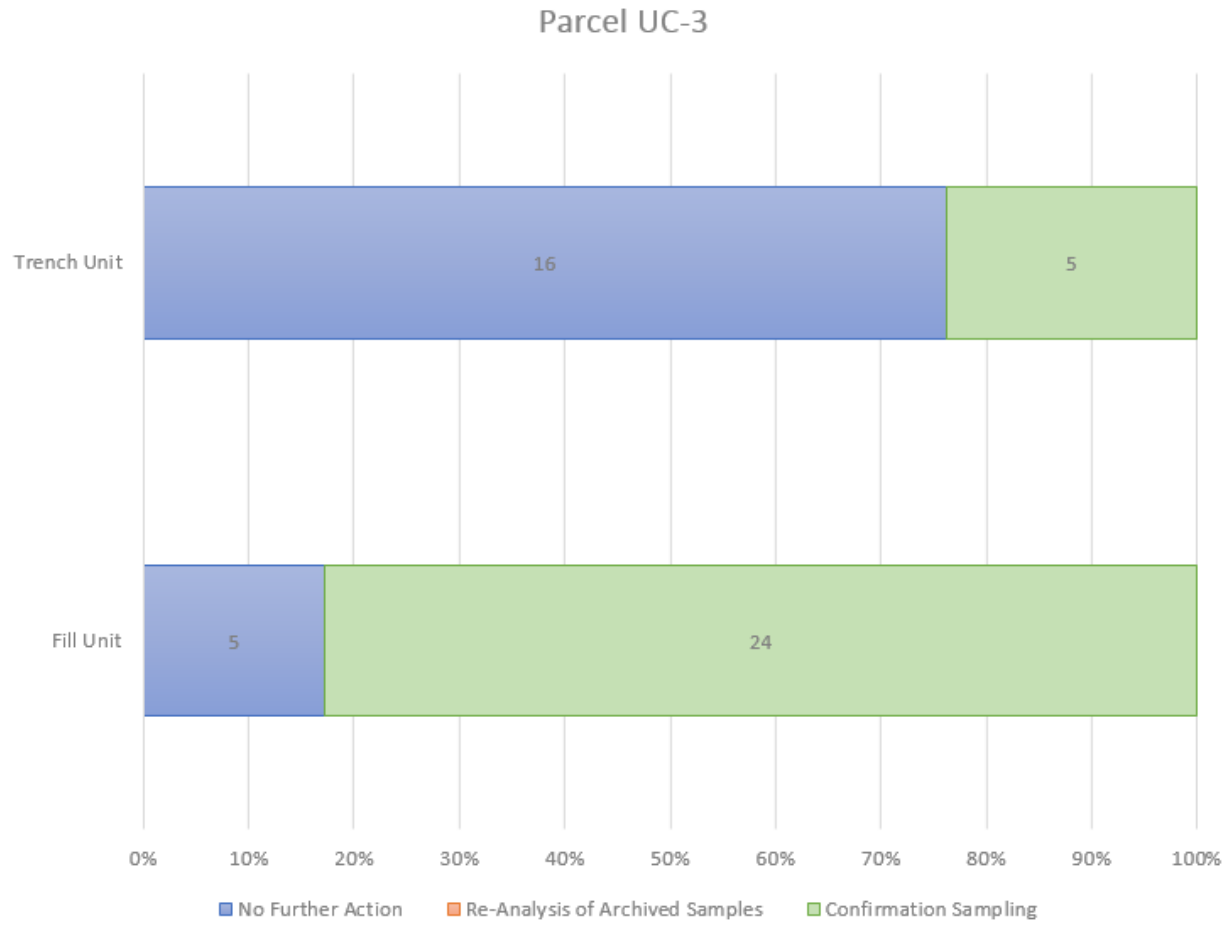
- Trench units - There was evidence of potential data manipulation or falsification at the eight trench units evaluated, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at 7 of the 20 fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining 13 fill units used as backfill for 7 trench survey units, and confirmation sampling is recommended. Of the 13 fill units, 13 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 1 of the 13 fill units recommended for confirmation sampling reported other inconsistencies and unusual findings during the evaluation.



Parcel UC-3

The areas evaluated in Parcel UC-3 included 21 trench units and 29 fill units. More than 1,800 soil samples were collected from these areas in 2010. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

- Trench units - There was no evidence of potential data manipulation or falsification identified at 16 of the 21 trench units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining five trench units, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at 5 of the 29 fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining 24 fill units used as backfill for 14 trench survey units, and confirmation sampling is recommended. Of the 24 fill units, 24 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 6 of the 24 fill units recommended for confirmation sampling reported other inconsistencies and unusual findings during the evaluation.



Assumptions and Uncertainties

The following assumptions and uncertainties are associated with this evaluation:

- This evaluation is based solely on available data. The procedures were developed to identify the potential for manipulation or falsification of soil samples previously collected by TtEC at HPNS. This evaluation should be used to identify recommended sampling locations and as a tool to help determine where additional data should be collected.
- The potential for falsification of gamma static measurements, where identified in the investigations of the trench units, was noted on the evaluation forms; however, confirmation sampling was only recommended if there was also evidence of potential manipulation or falsification in the soil sample data. It is expected that the results of gamma static measurements and soil sample data collected from the same location would be correlated; however, if either the gamma static measurements or soil samples were falsified or collected incorrectly, the data would not be correlated.

  The work plan did not provide specific instructions for performing gamma static measurements at systematic and bias locations. Gamma static measurement results were provided and the available documentation indicates the measurements were intended to be taken at locations where final systematic samples were collected. The data evaluation compared the gamma static measurement results with the soil sample results and gamma scan results. When differences between static, scan, and soil sample results were observed, the assumption of correlated results was rejected and each data set was evaluated independently. However, since final decisions regarding property transfer

were based solely on soil sample data and the collection of gamma static measurements was not considered in these decisions, confirmation sampling was only recommended when potential falsification of soil sample results was identified.

- Evidence of potential data manipulation and falsification was discovered during the Navy's soil data evaluation of Parcels D-2, UC-1, UC-2, and UC-3. Because it is impossible to determine whether every instance of potential data manipulation or falsification has been identified, the Navy recommends additional surveys and sampling beyond the areas with evidence of data manipulation. Additional soil sampling locations will be selected in coordination with the regulatory agencies.
- Data quality related to TtEC's laboratory analytical methods and procedures were not evaluated. Data quality has been assessed and approved by the Navy and regulatory agencies in previous reports submitted by TtEC.

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Acronyms and Abbreviations

Ac	actinium
Bi	bismuth
COC	chain-of-custody
cpm	count(s) per minute
cps	count(s) per second
Cs	cesium
CSR	construction summary report
ES	excavated soil unit
FRED	Final Radiological Evaluation Database
FSSR	final status survey results
G-RAM	general radioactive material
HPNS	Hunters Point Naval Shipyard
HRA	historical radiological assessment
K	potassium
K-S	Kolmogorov-Smirnov
K-W	Kruskal-Wallis
keV	kiloelectron volt
LLRW	low-level radioactive waste
mrem/yr	millirem(s) per year
Navy	Department of the Navy
NORM	naturally occurring radioactive material
NRDL	Navy Radiological Defense Laboratory
OB	overburden unit
Pb	lead
pCi/g	picocurie per gram
Ra	radium
RACR	removal action completion report
RASO	Radiological Affairs Support Office
ROC	radionuclide of concern
RSY	radiological screening yard
Sr	strontium
SUPR	survey unit project report
Th	thorium
TtEC	Tetra Tech EC, Inc.
TU	trench survey unit or trench unit
UC	utility corridor
USEPA	United States Environmental Protection Agency

SECTION 1

Introduction

This report summarizes background information and data evaluation activities conducted on the historical radiological data collected by Tetra Tech EC, Inc. (TtEC) at the former Hunters Point Naval Shipyard (HPNS), San Francisco, California, and findings from the evaluation of soil sample data from Parcels D-2, Utility Corridor (UC)-1, UC-2, and UC-3. HPNS encompasses approximately 934 acres, including approximately 491 acres on land, at the point of a high, rocky 2-mile-long peninsula projecting southeastward into the San Francisco Bay. HPNS is divided into parcels, which are further broken down into subparcels or work areas. The potential radiologically impacted sites identified in the Historical Radiological Assessment (HRA) (NAVSEA, 2004) included in this evaluation are located within Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 (**Figure 1-1**). Separate reports will be provided for interior building surfaces and for soil collected from other parcels at HPNS. This report is limited to the soil data at Parcels D-2, UC-1, UC-2, and UC-3. Other parcels and HPNS buildings will be addressed in future reports.

Radiological data collection and removal actions have been previously conducted by contractors[1] at these parcels using Department of the Navy (Navy) and regulatory agency-approved plans based on the HRA (NAVSEA, 2004) and release criteria documented in the Action Memorandum (Navy, 2006), followed by recommendations for radiological release. There have been various concerns raised regarding the integrity of the data collected during the prior radiological investigation and removal actions at HPNS. Specifically, there are allegations of fraudulent representations of data by TtEC.

In response to the concerns, the Navy assembled a Technical Team (a group of technical experts) to conduct an evaluation of the previous data in light of the claims made. The Technical Team includes representatives from the Navy, United States Environmental Protection Agency (USEPA), California Department of Toxic Substances Control, California Department of Public Health, the City of San Francisco, and Oregon State University. An independent, third-party team of nationally recognized experts has been contracted to support the Technical Team and perform the evaluation and confirmation investigation. This team includes Battelle, Cabrera Services, CH2M, Perma-Fix Environmental Services, and SC&A Environmental Services and Consulting. Oak Ridge Associated Universities and Argonne National Laboratory have been contracted to provide independent review of reports.

1.1 Objective

The objective of this evaluation is to review and assess the historical radiological data collected by TtEC at HPNS and recommend follow-up data collection needed to validate decisions regarding current property condition. Based on the findings from the evaluation, recommendations are made herein for next steps.

1.2 Scope of Data Evaluation

This evaluation was conducted to evaluate the historical radiological data collected by TtEC at HPNS and determine whether, when, and how follow-up data should be collected to validate decisions regarding the current property condition. The radiological data previously collected by TtEC in support of the investigation and remediation of the sanitary sewer line and utility corridor, and current and former

[1] This term refers to contractors who performed prior work at HPNS and who do not have any involvement in this evaluation. Further, the references herein to work and actions performed at HPNS by other contractors that are the subject of this evaluation are meant to pertain to prior work, including, but not limited to investigation, data gathering, and remediation. The members of the team conducting this evaluation had no involvement in the prior work of other contractors, and this evaluation relies solely on available information and documentation.

building sites include approximately 50,000 soil samples (equivalent to more than 900,000 analytical results) collected from more than 300 trench units, more than 500 fill units, more than 25 current and former building sites, and 11 survey units at the North Pier.

Figure 1-2 presents the areas evaluated by TtEC and defines the scope of the data evaluation.

1.3 Assumptions and Uncertainties

The following assumptions and uncertainties are associated with this evaluation:

- This evaluation is based solely on available data. The procedures were developed to identify the potential for manipulation or falsification of soil samples previously collected by TtEC at HPNS. This evaluation should be used to identify recommended sampling locations and as a tool to help determine where additional data should be collected.
- The potential for falsification of gamma static measurements, where identified in the investigations of the trench units, was noted on the evaluation forms; however, confirmation sampling was only recommended if there was also evidence of potential manipulation or falsification in the soil sample data. It is expected that the results of gamma static measurements and soil sample data collected from the same location would be correlated; however, if either the gamma static measurements or soil samples were falsified or collected incorrectly, the data would not be correlated.

  The work plan did not provide specific instructions for performing gamma static measurements at systematic and bias locations. Gamma static measurement results were provided and the available documentation indicates the measurements were intended to be taken at locations where final systematic samples were collected. The data evaluation compared the gamma static measurement results with the soil sample results and gamma scan results. When differences between static, scan, and soil sample results were observed, the assumption of correlated results was rejected and each data set was evaluated independently. However, since final decisions regarding property transfer were based solely on soil sample data and the collection of gamma static measurements was not considered in these decisions, confirmation sampling was only recommended when potential falsification of soil sample results was identified.
- Evidence of potential data manipulation and falsification was discovered during the Navy's soil data evaluation of Parcels D-2, UC-1, UC-2, and UC-3. Because it is impossible to determine whether every instance of potential data manipulation or falsification has been identified, the Navy recommends additional surveys and sampling beyond the areas with evidence of data manipulation. Additional soil sampling locations will be selected in coordination with the regulatory agencies.
- Data quality related to TtEC's laboratory analytical methods and procedures were not evaluated. Data quality has been assessed and approved by the Navy and regulatory agencies in previous reports submitted by TtEC.

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Legend:

PARCEL

- B
- C
- D-2
- E
- G
- UC-1
- UC-2
- UC-3

BASE MAP SOURCE:
Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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1 inch = 800 feet

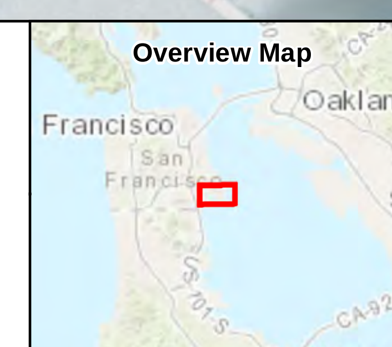
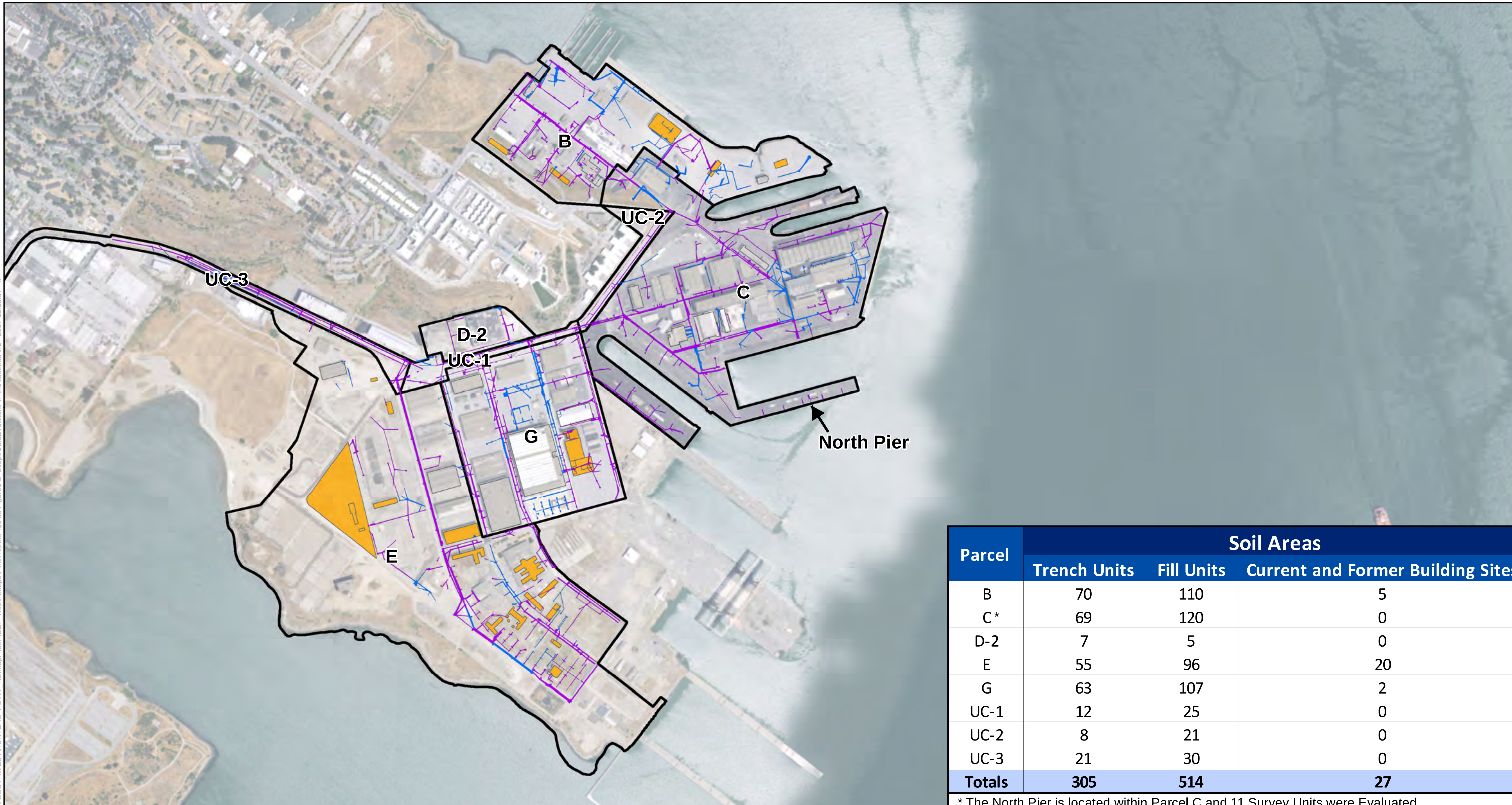


Figure 1-1
HPNS and Parcel Locations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California



Parcel	Soil Areas		
	Trench Units	Fill Units	Current and Former Building Sites
B	70	110	5
C *	69	120	0
D-2	7	5	0
E	55	96	20
G	63	107	2
UC-1	12	25	0
UC-2	8	21	0
UC-3	21	30	0
Totals	**305**	**514**	**27**

* The North Pier is located within Parcel C and 11 Survey Units were Evaluated

Legend:

- Trench Unit
- Trench and Fill Unit
- Current and Former Building Site
- Parcel

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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0 400 800 1,600 Feet
1 inch = 800 feet

Figure 1-2
Scope of Data Evaluation
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

SECTION 2

Radiological History

As part of the environmental investigations being performed to facilitate transfer of HPNS, the Navy prepared an HRA that documents the history of radiological materials at HPNS. The HRA is presented in two volumes. Volume I (NAVSEA, 2000) addresses radioactivity associated with the Naval Nuclear Propulsion Program and concludes that berthing of nuclear-powered ships at HPNS or work done on these ships resulted in no adverse effects on the human population or the environment. Volume II (NAVSEA, 2004) presents the history of general radioactive material (G-RAM) at HPNS in three primary operational areas:

- Use of G-RAM at HPNS by the naval shipyard and Triple A.
- Decontamination activities associated with ships that participated in atomic weapons testing, including Operation Crossroads.
- Radiological activities associated with the Radiation Safety Section/Radiation Laboratory Navy Radiological Defense Laboratory (NRDL).

In response to the HRA, an Action Memorandum for a time-critical removal action was prepared by the Navy in 2006, proposing removal actions to substantially eliminate identified pathways of receptor exposure to radioactive contamination for surrounding populations and nearby ecosystems, such as nearby wetlands and the San Francisco Bay (Navy, 2006). Areas with low-level radioactive contaminants addressed through radiological removal actions by TtEC include the following:

- Storm drains and sanitary sewer lines and associated surrounding soil (more than 28 miles of trench lines and 300,000 cubic yards of soil were investigated and removed or used as backfill).
- Soil associated with current and former building sites.

This section presents a description of the investigations and cleanup that TtEC was contracted to perform and is based on available documents reviewed and approved by the Navy and regulatory agencies. This section includes a summary of the Investigation Conclusion, Anomalous Soil Samples report (TtEC, 2014) in which soil data falsification was first documented, and a summary of former worker allegations of additional wrongdoing.

2.1 Storm Drain and Sanitary Sewer Line Investigation

The Navy initiated the basewide removal action of the storm drains and sanitary sewer systems in 2006 as a part of the time-critical removal action to address potential radiological materials in soil, debris, and structures at HPNS (Navy, 2006). Cesium (Cs)-137, radium (Ra)-226, and strontium (Sr)-90 are the radionuclides of concern (ROCs) for the storm and sanitary sewer system (NAVSEA, 2004). As outlined in the *Project Work Plan Revision 4, Base-Wide Storm Drain and Sanitary Sewer Removal, Hunters Point Shipyard, San Francisco, California* (Storm Drain Work Plan) (TtEC, 2010c), the storm drains and sanitary sewer systems were removed parcel by parcel or specified area. The storm drains and sewer lines were considered radiologically impacted because of the possibility that radioactive waste materials had been disposed of in sinks and drains. The soil immediately below the lines was considered impacted to account for potential leakage, and the soil above the lines was considered impacted to account for undocumented repairs to the lines that may have mixed contaminated soil from leakage areas with overlying soil.

The storm drain and sewer line removal action included excavation of soil, removal of pipelines, plugging of open sewer or storm drain lines left in place during the removal process, ex situ radiological screening and sampling of the pipeline, and performance of Final Status Surveys of the excavated soils

and exposed excavation of trench surfaces. Excavated soil overlying storm drains and sanitary sewer lines was to be "removed to a minimum of 1 foot below and to the sides of each storm drain and sanitary sewer pipeline."

Excavated soil was transported to a radiological screening yard (RSY) pad for radiological surveys to determine whether the soil could be reused as backfill or required disposal. The soil was placed on screening pads in lifts, not exceeding 6 inches in height and up to 1,000 square meters in area. The radiological survey of excavated soil consisted of a high-density gamma surface scan, supported by global positioning system equipment. An investigation level for scan surveys was established to identify elevated levels of radioactivity. If the investigation level was exceeded, biased samples were collected at locations where elevated levels of radioactivity were identified, and soil characterized by laboratory analytical results above the release criteria was removed.

A minimum of 18 systematic soil samples were then collected from excavated soil on each screening pad based on a random starting point. Following radiological clearance for unrestricted use, soil excavated from areas within Installation Restoration Program sites was stockpiled and sampled for the site-specific chemicals of concern and either reused for trench backfill or disposed of as chemically contaminated waste. Radiologically cleared soil excavated from non-Installation Restoration Program sites (sites where chemical contamination had not been identified) was stockpiled separately and used as backfill without chemical testing.

After transporting excavated soil to the RSY pads, the piping was removed. The interior surfaces of the piping were radiologically characterized using a combination of static and scan measurements for total radioactivity and swipe sampling for removable radioactivity. If a sufficient quantity of solid material was present in the pipeline, solid/sediment samples were collected and analyzed for radiological contamination. At this stage, nearly all radioactive contamination is expected to have been removed. Surveying and sampling of the soil above and below the piping was a conservative measure implemented by the Navy.

After removal of piping and soil at least 1 foot beneath the piping, the trench was divided into sections such that the sum of the trench sidewalls and bottom was less than 1,000 square meters in area. This area is called a trench survey unit. Final Status Surveys for the excavated pipeline trench survey units included 100 percent gamma radiation scan surveys to identify elevated levels of radioactivity prior to systematic and biased soil sample collection. A minimum of 18 soil samples were located within each trench survey unit. The samples were analyzed by gamma spectroscopy at the onsite laboratory, with 10 percent of the samples sent to the offsite laboratory for quality control verification. Additionally, 10 percent of the samples were analyzed for Sr-90 by the onsite laboratory. If Cs-137 results from the onsite laboratory were at or above the release criteria, isotopic plutonium, isotopic uranium, and Sr-90 were also analyzed by the offsite laboratory. Analytical results for Ra-226 were reported by the onsite laboratory using a screening method based on the 186 kiloelectron volt (keV) energy peak. The offsite laboratory analyzed Ra-226 using a definitive method, allowing the soil samples to equilibrate (21-day in-growth) and reported concentrations using the 609 keV energy peak for Bi-214. The screening method used by the onsite laboratory was selected to allow for rapid decision making during field investigations and to prevent health and safety concerns associated with large open excavations.

Three types of survey units were established: trench, overburden, and excavated soil (TtEC, 2011). Overburden survey units were specific to Parcel B and included overburden soil, which was defined as soils from excavations not in the immediate 1-foot vicinity of sewer or storm drain piping. Peripheral soils, also specific to Parcel B, were within the 1-foot vicinity of sewer or storm drain piping. This soil was stockpiled separately and surveyed on RSY pads. If peripheral soil was identified as low-level radioactive waste (LLRW), it was disposed of, and the trench segment where the peripheral soil originated was sampled in 3-foot intervals to determine the extent of potential contamination. For excavations in other parcels, excavated soil (including overburden and peripheral soil) was placed on RSY pads and referred

to as excavated soil units. To obtain radiological release, a single survey unit at HPNS was the sum of a trench unit (TU) that was excavated and the overburden or excavated soil units that were used to backfill the trench. For the evaluations detailed in this report, excavation units and overburden units will often be referred to as "fill" units.

The results of the storm drain and sanitary sewer line investigation activities performed by TtEC were documented in Survey Unit Project Reports (SUPRs). SUPRs were included as attachments in parcel-specific Removal Action Completion Reports (RACRs) or in Radiological Construction Summary Reports (CSRs).

2.2 Release Criteria

Release criteria for all ROCs except Ra-226 are based on USEPA release criteria for soil. For Ra-226, the release criterion agreed to by the Navy and regulatory agencies is 1 picocurie per gram (pCi/g) above the background activity. The background activity was calculated for several areas in HPNS to account for variations in soil type. The "background" was calculated as the arithmetic mean of 18 samples collected in an area free of potential contamination. The background activity used for Parcels D-2, UC-1, UC-2, and UC-3 is 0.485 pCi/g unless noted otherwise. For soil in the United States, the expected Ra-226 activity is 1 pCi/g and can range from 0.2 to 4 pCi/g (DoD et al., 2009). Therefore, the HPNS background value for Ra-226 is conservative.

Table 2-1 summarizes the release criteria established by the Action Memorandum (Navy, 2006).

Table 2-1. Release Criteria

	Soil (pCi/g)			
Radionuclide	**Outdoor Worker (pCi/g)**	**Residual Dose (mrem/yr)**	**Residential (pCi/g)**	**Residual Dose (mrem/yr)**
Cesium-137	0.113	0.2142	0.113	0.2561
Radium-226	1.0	6.342	1.0	14.59
Strontium-90	10.8	0.1931	0.331	1.648

Note:
mrem/yr = millirem(s) per year

Source:
TtEC. 2011. Survey Unit Project Reports Abstract, Sanitary Sewer and Storm Drain Removal Project, Hunters Point Shipyard, San Francisco, California, Revision 3. July 7.

2.3 Anomalous Soil Samples Report

The first evidence of soil sample data manipulation and falsification is summarized in the Investigation Conclusion, Anomalous Soil Samples report (TtEC, 2014). TtEC conducted an investigation after Radiological Affairs Support Office (RASO) noted that the final systematic soil sample results from a building site survey unit in Parcel E appeared to be representative of two different data populations, indicating that the soil samples had not been collected where they were purported to have been collected. This report concluded that in addition to this survey unit, 15 survey units and 4 trench units in Parcels C and E had a high probability that the soil samples were not representative of the respective survey units. Seven other locations were identified for further evaluation. TtEC concluded that the persons listed as the sample collectors, either by themselves or in conjunction with others, collected soil samples in areas outside the designated survey units. TtEC implemented a series of corrective actions

and considered the action items closed, stating that "TtEC had not had a reoccurrence of the type of anomalous soil sample results that led to this investigation, indicating that the corrective actions have addressed the problem." Ultimately, TtEC conducted rework at each of the survey units identified. Subsequently, former workers at HPNS alleged additional and more widespread data manipulation and falsification.

2.4 Former Worker Allegations

Allegations of soil data manipulation and falsification made by former TtEC workers include the following:

- When sufficiently low levels of contamination were not obtained, soil samples were collected from a different area known to have lower radioactivity, and reported as having come from the location being investigated.
- Samples and analytical results were discarded when the results were above the release criteria.
- Instead of collecting soil samples from locations predetermined to have higher gamma scan readings, samples would be collected from nearby soil and represented as having come from the original location.
- When sufficiently low levels of contamination were not obtained, soil sample collection sites were moved 5 to 10 feet in another direction, and a new sample was obtained. The new sample was represented as having been obtained from the original location.
- Chain-of-custody (COC) forms were falsified to support the false sample collection information.
- During the screening of overburden soil, actual towed array speeds were greater than allowed speeds, thereby reducing the probability of radiation detection.
- Handheld detectors were used improperly, which may have led to increasing the detection limit of the scanning devices.
- Onsite soil sample results were reviewed and shipment of samples to the offsite lab was blocked if there was a high chance that the release criteria would be exceeded.

SECTION 3

Data Evaluation Activities

The evaluation was conducted to (1) identify anomalies (unusual or suspect data) that suggest the possibility of prior data manipulation or falsification; (2) perform detailed reviews to further evaluate anomalous data; and (3) recommend additional data collection to confirm existing data, or replace potentially manipulated or falsified data. This evaluation process included developing databases, establishing a list of primary radionuclides to evaluate, and developing a form to standardize the assessment and document the data evaluation results. This section describes the purpose and approach of each element of the data evaluation and identifies how suspect data were flagged:

- **Final Radiological Evaluation Database (FRED) for Soil**
  - Purpose – To base the data evaluation on an electronic soil sample database that is consistent with data provided in the final written reports by TtEC (for example, SUPRs, final status survey results [FSSRs], RACRs, CSRs).
  - Approach – Identified incorrect and missing data in TtEC's database, filled data gaps using optical character recognition to extract soil data from printed versions of draft and final reports, and hand-entered data from older reports. A quality control review was conducted to confirm the accuracy and completeness of the electronic files. Soil sample data from the sanitary sewer line and current and former building site investigations were categorized by the reason the data were originally collected. For example, the final set of systematic samples as reported in the SUPRs were collected to represent the radiological conditions for the entire survey unit at the end of the project and were designated as "FSS-SYS" in FRED, and are also referred to as "FSS" and "Final Systematic" in this evaluation. Other systematic samples (collected prior to the final systematic samples) that describe radiological conditions for the entire survey unit at different times were designated as "SYS_1" and "SYS_2" in FRED, and are also referred to as "Characterization" samples in the evaluations. Biased samples that were collected to determine the limits of soil exceeding the release criteria or to confirm the successful removal of soil exceeding the release criteria, were designated as "FSS-BIAS" and "RAS" in FRED, and are also referred to as "Confirmatory" and "Bias" in this evaluation. The number of analytical results and soil samples included in the FRED is included on **Figure 3-1**.
- **Primary Radionuclides to Evaluate**
  - Purpose – To focus the presentation and interpretation of results on potential contaminants and the naturally occurring radioactive material (NORM) that can be used to help identify suspect data.
  - Approach – Used naturally occurring radionuclides that are not contaminants as the primary radionuclides to evaluate because they are universally present in nearly all soil and their level of radioactivity varies by soil type, which enabled the team to "fingerprint" the soil and identify soil samples that may have been switched. Naturally occurring radionuclides are expected to have detectable levels of radioactivity in soil samples. Through discussions with the team, the following primary radionuclides were identified for evaluation:
    - Bismuth (Bi)-214, a Ra-226 daughter product often used as surrogate for Ra-226
    - Potassium (K)-40
    - Actinium (Ac)-228, a thorium (Th)-232 daughter product often used as a surrogate for Th- 232

  - Other naturally occurring radionuclides (including Th-232 progeny Bi-212 and lead (Pb)-212, and Ra-226 and progeny Pb-214) were evaluated when additional information was needed. ROCs not identified as primary radionuclides for this evaluation include Sr-90 and Cs-137, which are present in soil from fallout as a result of nuclear testing. Sr-90 was only analyzed in 10 percent of the soil samples, limiting its usefulness in the evaluation. Cs-137 is only discussed in the evaluation if exceedances of the release criterion in soil were reported.

- **Statistical Tests**
  - Purpose – To identify statistical inconsistencies in the soil data.
  - Approach – Several statistical tests (Kolmogorov-Smirnov [K-S], Peacock, Kruskal-Wallis [K-W], Benford's Law, Repeated Numbers, Hierarchical Cluster Analysis) were run using six data sets (final systematic data for onsite laboratory, offsite laboratory, and combined onsite and offsite laboratory; pre-remediation systematic data for onsite laboratory, offsite laboratory, and combined onsite and offsite laboratory) to identify groups of soil data statistically different from the data collected within a specific parcel. The data were grouped by survey unit[2], and the results for each survey unit were compared to all other survey units within the same parcel. The data were also grouped by collection date, and the results for each collection date were compared to all other days that samples were collected within the parcel. Because only 10 percent of the soil samples were required to be sent to the offsite laboratory for analysis, the K-S test results for the Final Status Survey data from the onsite and offsite laboratory were combined for the primary radionuclides listed above, to allow for enough data for comparison. K-S test results are included in **Appendix A**. The results from the other statistical tests were available for review during the evaluation as needed.
  - How data were flagged as unusual or suspect – A trench, overburden, excavation soil unit, or current and former building survey unit was flagged if the distribution of sample results (for example, mean and standard deviation) for a given radionuclide collected within the respective unit was significantly different from data collected for all other respective units within a parcel, and if the distribution of sample results for samples collected on a single day was significantly different from the data collected during all other days when samples were collected in a Parcel.
- **Logic Tests**
  - Purpose – To identify inconsistencies in the prior collection, handling, and processing of individual soil samples.
  - Approach – Logic tests were developed using the gamma spectrometry data available in the reports (SUPRs, FSSRs, RACRs, and CSRs) to identify anomalies in how soil samples were previously processed. Available data include sample collection dates, sample analysis dates, and sample masses reported by the onsite laboratory. It is expected that final systematic soil samples would have been collected as a group on the same day, would have been the final set of samples collected, would have been analyzed as a group within 2 working days, would have been collected before they were counted by the onsite laboratory, and would have been counted by the onsite laboratory within 2 weeks of sample collection to meet production schedules. It is expected that the sample mass reported by the onsite laboratory would have matched the sample mass reported by the offsite laboratory.

[2] For the evaluation of trench units, the data for one trench unit was compared against the data for all other trench units within a parcel. For the evaluation of fill units, fill units were grouped by the survey unit they were associated with as presented in the SUPRs, and comparisons were made on a survey unit basis. Additionally, based on the number of data points in Parcel D-2, the trench and fill unit data for Parcels B and D-2 were combined and the trench and fill data for Parcels UC-1, UC-2, and UC-3 were combined.

- How data were flagged as unusual or suspect – Gamma spectrometry data were flagged if final systematic soil samples were collected over multiple days, were collected before a set of confirmatory/bias samples, were analyzed over a period spanning more than 2 working days, were analyzed before they were collected, or were analyzed by the onsite laboratory more than 2 weeks after sample collection. Data were flagged if the sample mass reported by the onsite laboratory was inconsistent with the sample mass reported by the offsite laboratory.

- **Graphical Data Review**
  - Purpose – To identify anomalies or unusual trends in the soil data by visually interpreting graphical representations of the data.
  - Approach – Plots of the data were generated to provide tools for visual identification of inconsistencies, outliers, and trends within a given data set. Time-series plots were generated to present sample results as a function of collection date. Time-series plots included all soil data collected for a given unit. Box plots were generated to present the statistical distribution of data. Normal quantile plots were generated to identify whether all the data in the given data set were from a normally distributed population. Plots were generated for the naturally occurring, non-contaminant radionuclides Ac-228, Bi-214, and K-40, and separate box and normal quantile plots were generated for each sample type (bias, characterization, final systematic). Plots were also generated for Cs-137 if the reported soil concentrations exceeded the release criteria.
  - How data were flagged as unusual or suspect – Data were flagged if sample results for naturally occurring radionuclides were at or below zero; if final systematic samples indicated the potential for multiple data populations (e.g., potentially two or more soil types); and if the distribution of bias, characterization, and/or final systematic soil sample data within a data set were inconsistent, unusual, or not expected. Unique cases were noted if encountered.

- **Historically Significant Sites**
  - Purpose – To identify areas where potential contamination was more likely and manipulation or falsification of data would have underestimated site conditions to the greatest extent.
  - Approach – A map was generated to identify buildings designated as impacted in the HRA and sites where a known radiological cleanup was performed that were located in the vicinity of the trench survey unit data being evaluated (**Figure 3-2**).
  - How data were flagged as unusual or suspect – A trench or survey unit was flagged if it was adjacent to or downstream from a known radiological cleanup site or radiologically impacted building. Fill units were flagged if the soil used to create the fill unit originated from a trench unit that was adjacent or downstream from a known radiological cleanup site or radiologically impacted building.

- **Sites Based on Allegations**
  - Purpose – To identify sites based on allegations of potential data manipulation or falsification.
  - Approach – A list of TtEC employees and subcontractors potentially associated with allegations of data manipulation or falsification was provided by the Navy based on worker allegations, and the list was compared to available sample collection documents (SUPRs, FSSRs, RACRs, and CSRs). Available COC records are in the process of review to identify potential discrepancies such as sample times, dates relinquished, sampler names, and sampler signatures.
  - How data were flagged as unusual or suspect – Data were flagged if the name of a worker on the list provided by the Navy matched the name provided in available sample collection documentation. In most cases, the SUPR provided the name of the worker who performed the

gamma scan and gamma static measurements. Although a direct correlation could not be made, it was assumed that the worker who performed the gamma scan and gamma static measurements was involved with sample collection. Data will be further scrutinized if the COCs[3] indicate that the time sampled listed is after the sample was relinquished, the COC was relinquished by someone other than the sampler, uniform time internals, samplers listed as collecting samples at multiple locations at the same time, and signatures.

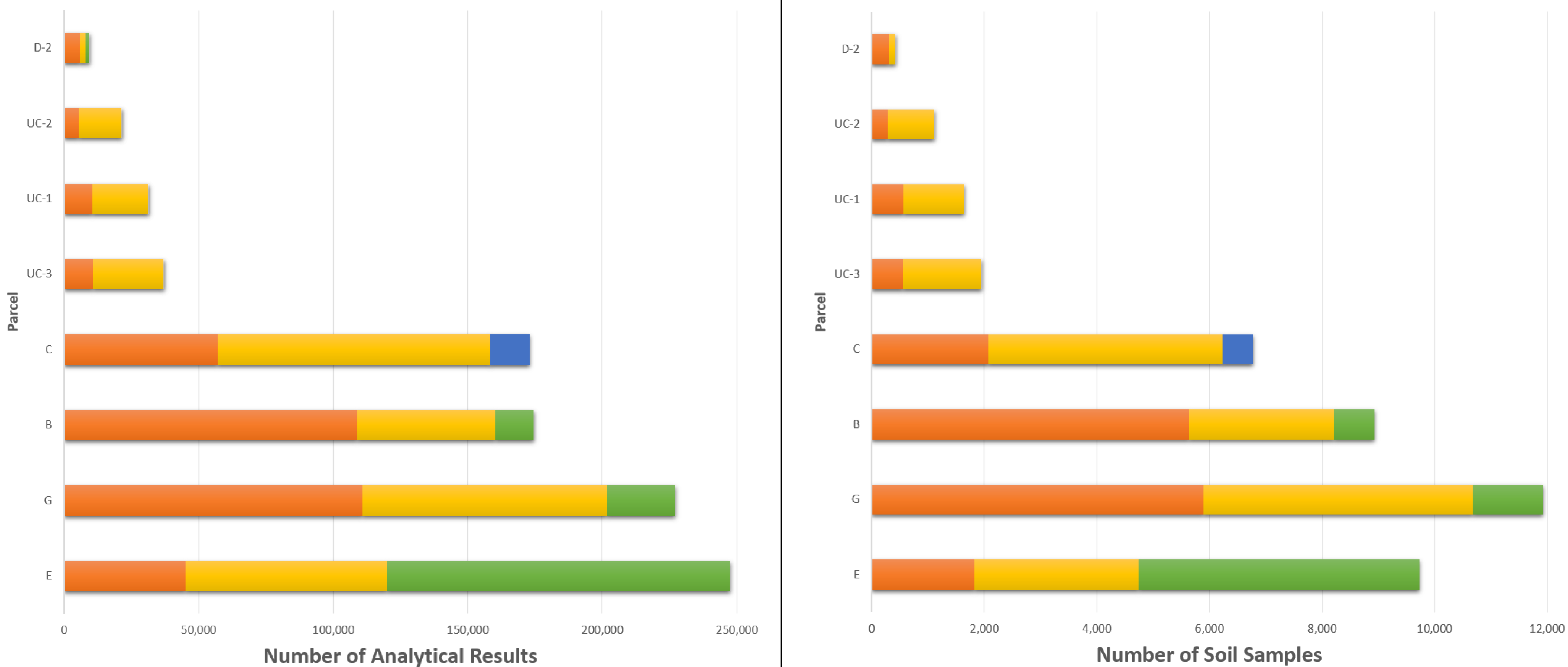
To address the flags discussed above, additional methods of evaluation were conducted, including database review, review of adjacent trench and survey units, and review of historical reports. The review of the database was performed to further investigate logic test results and other anomalies as needed. If the database review could not explain unusual trends, a comparison was performed against data collected from adjacent trench and survey units. Although it may not be true in all instances, it is expected that geographically localized results would be consistent. Historical reports, including SUPRs, FSSRs, RACRs, and CSRs, were reviewed to document observations regarding investigation activities, gamma static and scan measurements, the relationship between reported onsite and offsite laboratory data, and excavation and backfill activities. For trench unit evaluations, the disposition of soil excavated from the trench and fill units that were used to backfill the trench, were documented. For fill unit evaluations, the trench unit where the fill unit was used to backfill and the trench units from which soil was used to create the fill unit, were documented.

To document the data evaluation, findings, and recommended path forward, an evaluation form was developed. An example data evaluation form is included as **Appendix B**. There are three sections on the form, as follows:

- Section I identifies unusual, suspect, or anomalous data; lists the flags from the K-S and logic tests; and presents observations from time-series plots, historically significant sites, and allegations.
- Section II documents the review of the box and normal quantile plots, additional database review, adjacent survey or trench unit review, and review of historical reports.
- Section III summarizes the conclusions and recommendations.

An evaluation was performed for each trench unit, fill unit, and the current and former building site survey units by health physicists. The evaluation was reviewed by senior health physicists, Navy Base Realignment and Closure, and RASO. The time-series, box, and normal quantile plots and a location map are included at the end of each form.

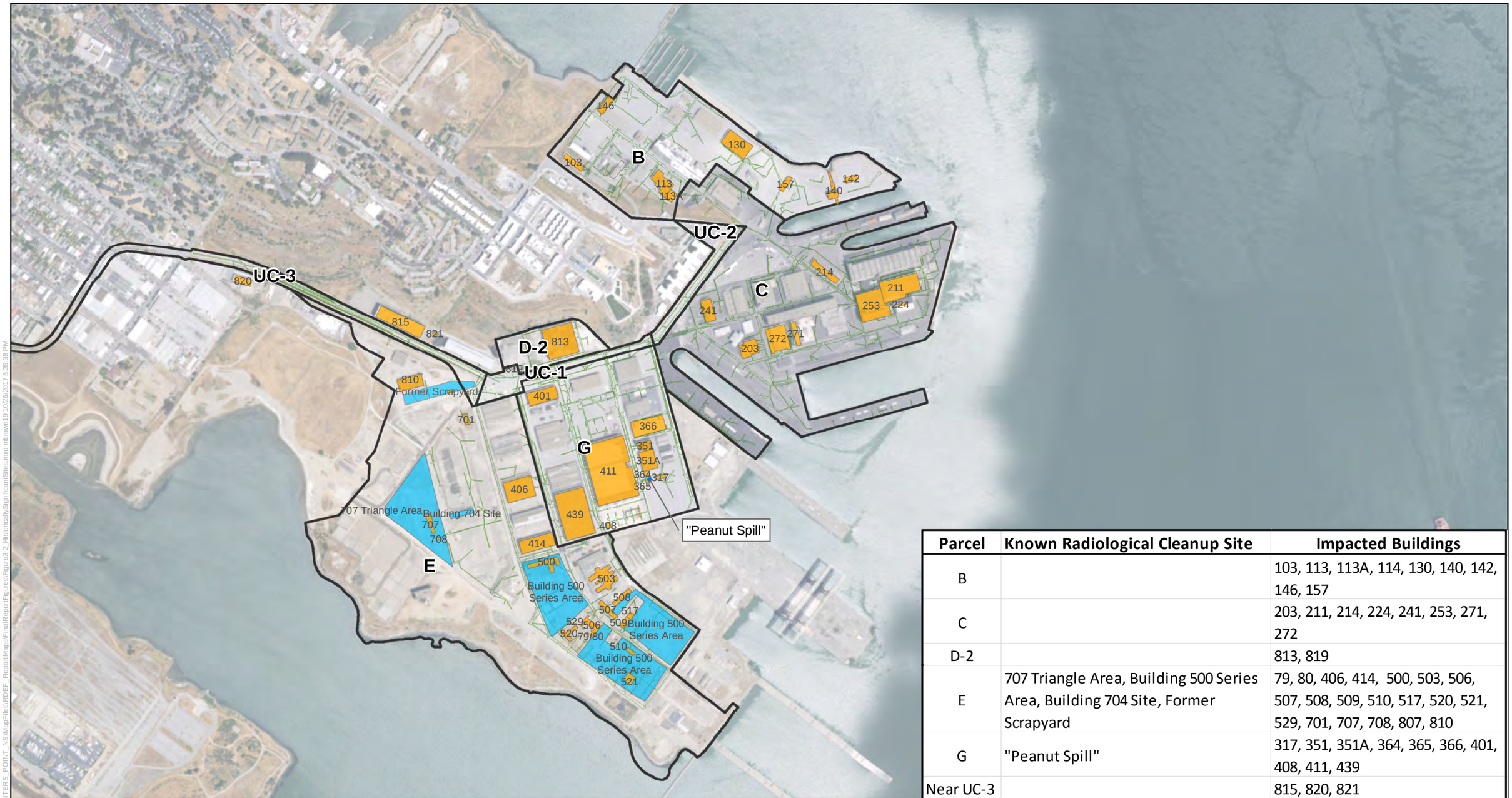
[3] COCs were collected from the archived samples located at HPNS and include COCs by TtEC ranging from 2009 through 2016. An inventory and evaluation of the available COCs is currently being conducted and was not complete at the time of this report. The COCs will be evaluated and incorporated into this evaluation.



Legend:

- Trench Unit
- Fill Unit
- Current and Former Building Site
- North Pier

Figure 3-1
FRED Soil Sample Summary
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California



Parcel	Known Radiological Cleanup Site	Impacted Buildings
B		103, 113, 113A, 114, 130, 140, 142, 146, 157
C		203, 211, 214, 224, 241, 253, 271, 272
D-2		813, 819
E	707 Triangle Area, Building 500 Series Area, Building 704 Site, Former Scrapyard	79, 80, 406, 414, 500, 503, 506, 507, 508, 509, 510, 517, 520, 521, 529, 701, 707, 708, 807, 810
G	"Peanut Spill"	317, 351, 351A, 364, 365, 366, 401, 408, 411, 439
Near UC-3		815, 820, 821

Legend:

- Known Radiological Cleanup Sites
- Impacted Building
- Trench Unit
- Parcel

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 400 800 1,600 Feet

1 inch = 800 feet

Figure 3-2
Historically Significant Sites
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

R:\ENBG\00_Proj\NNavy\CLEANSOUTHWEST\HUNTERS_POINT_NS\MapFiles\RDEF_ReportMaps\FinalReport\Figures\Figure3-2_HistoricallySignificantSites.mxd mbrown10 10/26/2017 5:39:38 PM

SECTION 4

Findings and Recommendations

A summary of findings and recommendations for each parcel for trench units and fill units is provided in the following sections. An abbreviated write-up of the findings and recommendations for trench units and fill units recommended for further action is included in the following sections. Each write-up generally includes bulleted lists of the flags (from Section I of the forms), findings from the additional reviews if they indicated potential data manipulation or falsification (from Section II of the forms), and the conclusions and recommendations (from Section III of the forms). The write-ups for fill units with similar conclusions and recommendations were grouped together and summarize Section III of the forms. For more detailed information, see the evaluation forms included in **Appendix C**.

Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, recommendations are provided for no further action, reanalysis of archived samples, confirmation sampling, or physical inspection of archived samples. These recommendations are defined as follows:

- **No Further Action** – No further evaluation of the data is recommended during this phase of the project as it did not appear that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.
- **Reanalysis of Archived Samples** – Reanalysis of the archived soil samples (samples collected by TtEC that may be available in onsite storage) collected as initial systematic sample data at an offsite laboratory is recommended. The evaluation indicated evidence of potential data manipulation or falsification of final systematic sample data. The purpose for the reanalysis is to a) compare the initial systematic sample results to the release criteria to see if the results may reveal that the release criteria were met and remediation was not required[4] even though final systematic sample results were potentially manipulated and falsified, or b) provide offsite laboratory results to document current site conditions.
- **Confirmation Sampling** – Collection of additional data (surveys, scans, or soil samples) is recommended during this phase of the project. The evaluation indicated evidence of potential data manipulation or falsification based upon the methods used to review the data. The available data are suspect and additional data are needed to document current site conditions. Task-specific plans will be provided detailing the extent of the confirmation sampling activities.
- **Physical Inspection of Archived Samples** – Physical inspection of archived soil samples (samples collected by TtEC that may be available in onsite storage) is recommended during this phase of the project. The evaluation indicated evidence of potential data manipulation or falsification based upon the methods to review the data. The purpose of the physical inspection of the samples is to determine whether the physical soil characteristics are what would be expected given the sample's collection location. This comparison will help determine whether data have been manipulated or falsified.

[4] Analytical results for Ra-226 were reported by the onsite laboratory using a screening method based on the 186 keV energy peak. The offsite laboratory analyzed Ra-226 using a definitive method, allowing the soil samples to equilibrate (21-day in-growth) and reported concentrations using the 609 keV energy peak for Bi-214. Comparisons between the onsite laboratory screening results and the offsite laboratory definitive results for Ra-226 demonstrate the onsite laboratory results were consistently biased high. The Ra-226 analytical results from the onsite laboratory resulted in false exceedances of the release criteria, which resulted in the initiation of remediation. Remediation may have been avoided had soil samples been allowed to equilibrate (21-day in-growth) and decisions had been based on the more reliable Bi-214 analysis using the 609 keV energy peak. The screening method used by the onsite laboratory was selected to allow for rapid decision making during field investigations and to prevent health and safety concerns associated with large open excavations.

Much of the evaluation of Parcels D-2, UC-1, UC-2, and UC-3 focused on soil samples collected from storm drain and sanitary sewer line excavations. These drain lines were considered impacted because of the potential for radioactive waste disposal into sinks and drains. If this occurred, radioactive material was likely contained within the piping, and the piping was excavated, removed and disposed of as LLRW. The soil excavated during drain line removal was analyzed for radionuclides because soil beneath the piping may have been contaminated if the piping leaked, and soil above the piping may have been contaminated if the drain lines were repaired or replaced in an area where leakage occurred. Contamination from leakage or drain line repair should be relatively rare, yet the release criterion for Ra-226 was exceeded many times in soil samples collected from the excavated soil and trench sidewalls. After carefully examining the analytical data and the conceptual model for soil contamination, it is concluded that the upper range of naturally occurring Ra-226 exceeds the release criterion. Therefore, cleanup will be hampered without an understanding that naturally occurring Ra-226 may exceed the release criterion without being indicative of contamination. The Navy's plans for further evaluation of naturally occurring Ra-226 will be described in the Work Plan for Radiological Data Evaluation and Confirmation Survey.

4.1 Parcel D-2

The areas evaluated in Parcel D-2 included seven trench units and five fill units. Analytical results for more than 400 soil samples were evaluated. The areas evaluated in Parcel D-2 are presented on **Figure 4-1** and consist of samples collected from 2006 through 2009.

4.1.1 Trench Units

There were seven trench units evaluated in Parcel D-2. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at six trench units; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining trench unit, and confirmation sampling is recommended. The results of the Parcel D-2 trench unit evaluation are presented on **Figure 4-2**. The data evaluation forms documenting the findings are provided in **Appendix C**.

The following text summarizes the evaluations of the trench unit where evidence of potential data manipulation or falsification was found.

4.1.1.1 Recommended for Confirmation Sampling

Trench Unit 135

Trench Survey Unit 135 is the net sum of TU 135 and a volume of import fill material, which was used as backfill. Approximately 15 cubic yards of soil were remediated from TU 135 based on a subset of characterization and biased samples exceeding the release criterion for Ra-226. A total of 71 samples was collected from TU 135: 36 characterization samples, 17 biased samples to confirm the successful removal of soil with concentrations of Ra-226 above the release criterion, and a set of 18 final systematic samples.

Data from TU 135 were flagged as unusual or suspect for the following reasons:

- Graphical data review identified anomalies or unusual trends in the soil sample data collected from TU 135.
- TU 135 is located downstream from a radiologically impacted building.
- At least one worker who collected data at TU 135 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 135 stated that the gamma scan did not exceed the investigation level (7,013 counts per minute [cpm]). However, the gamma scan range provided in the SUPR for TU 135 was 5,200 to 7,600 cpm. The reported results provided in the SUPR is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, the locations with scan measurements that exceeded the investigation are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

4.1.2 Fill Units

There were five fill units evaluated in Parcel D-2. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at one fill unit; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at four fill units used as backfill for four trench survey units, and confirmation sampling is recommended. Of the four fill units, all four were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. The results of the Parcel D-2 fill unit evaluation are presented on **Figure 4-3**. The data evaluation forms documenting findings are provided in **Appendix C**.

The following text summarizes the evaluations of the four fill units where evidence of potential data manipulation or falsification was found.

Overburden Units 136, 137, 141, and 172

The gamma scan for four overburden units in Parcel D-2 identified several measurements above the investigation level, which prompted the collection of biased soil samples in addition to the standard 18 final systematic samples. However, none of these biased sample results identified activity above the release criteria for any ROC. The concern is that the biased samples were not collected at the locations of the highest gamma scan measurement. This narrative is consistent with the allegation that biased samples were collected in areas to avoid potentially elevated soil sample results. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions at fill units Overburden Unit (OB) 136, OB 137, OB 141, and OB 172.

4.2 Parcel UC-1

The areas evaluated in Parcel UC-1 included 12 trench units and 25 fill units. Analytical results for more than 1,600 soil samples were evaluated. The areas evaluated in Parcel UC-1 are presented on **Figure 4-4** and consist of samples collected from 2009 through 2010.

4.2.1 Trench Units

There were 12 trench units evaluated in Parcel UC-1. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at three trench units; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at nine trench units, and confirmation sampling is recommended. The results of the Parcel UC-1 trench unit evaluation are presented on **Figure 4-5**. The data evaluation forms documenting the findings are provided in **Appendix C**.

The following text summarizes the evaluations of the nine trench units where evidence of potential data manipulation or falsification was found.

4.2.1.1 Recommended for Confirmation Sampling

Trench Unit 140

Trench Survey Unit 140 is the net sum of TU 140, excavated soil from Excavated Soil Unit (ES) 220 and ES 224, and a volume of import fill material, which was used for backfill. Two sediment samples collected from piping removed from TU 140 indicated the presence of Cs-137 at concentrations exceeding the release criterion. Approximately 3 cubic yards of soil were remediated from TU 140 based on 1 characterization sample exceeding the release criterion for Cs-137. A total of 44 samples was collected from TU 140: 18 characterization samples, 5 samples to identify potential elevated Cs-137 concentrations in soil, 3 samples to confirm the successful removal of soil with concentrations of Cs-137 above the release criterion, and a set of 18 final systematic samples.

Data from TU 140 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 140 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- At least one worker who collected data at TU 140 was mentioned in one or more allegations of wrongdoing.

The gamma scan range provided in the SUPR for TU 140 was 3,690 to 11,190 cpm. The SUPR for TU 140 stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. Although some remediation occurred at the trench unit, the gamma scan was performed after the remediation was completed. The reported results provided in the SUPR is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 143

Trench Unit 143 is the net sum of TU 143 and excavated soil from ES 188, which was used for backfill. TU 143 is located in Parcels UC-1 and UC-2. One sediment sample collected from piping removed from TU 143 showed elevated Ra-226 concentrations exceeding the release criterion; however, no elevated Ra-226 concentrations were reported in soil sample results. No remediation was performed at TU 143. A total of 45 samples was collected from TU 143: 27 biased samples to identify potential elevated Ra-226 concentrations in soil and a set of 18 final systematic samples.

Data from TU 143 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 143 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- At least one worker who collected data at TU 143 was mentioned in one or more allegations of wrongdoing.

The gamma scan range provided in the SUPR for TU 143 was 4,640 to 7,570 cpm. The SUPR for TU 143 stated that the gamma scan data exceeded the investigation level (7,048 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. This is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 147

Trench Survey Unit 147 is the net sum of TU 147; excavated soil from ES 181, ES 184, and ES 189; and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 147 indicated the presence of Cs-137 at concentrations exceeding the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. Additionally, one of the sediment samples indicated the presence of Ra-226 at concentrations exceeding the release criterion; however, no elevated Ra-226 concentrations were reported in soil sample results. No remediation was performed at TU 147, and a set of 18 final systematic samples was collected.

Data from TU 147 were flagged as unusual or suspect for the following reasons:

- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 147.
- At least one worker who collected data at TU 147 was mentioned in one or more allegations of wrongdoing.

One final systematic sample result was inconsistent with the rest of the final systematic sample results, in that the reported Ac-228, Bi-214, and K-40 concentrations for the one sample were significantly lower than the Ac-228, Bi-214, and K-40 concentrations for the rest of the data set. There were insufficient offsite laboratory data to confirm these results. The SUPR for TU 147 indicated that “no additional biased sampling was performed since the bottom of the trench was native serpentine rock”, as an explanation for not collecting biased samples in response to elevated concentrations reported in piping removed from TU 147. However, no issue was noted about the ability to collect the final systematic samples. This is an indication that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 147. Furthermore, the low end of the gamma scan range (940 cpm) provided in the SUPR was unusually low.

The results of the evaluation indicate that the final systematic sample results are suspect, and confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Trench Unit 148

Trench Survey Unit 148 is the net sum of Trench Unit 148; excavated soil from ES 221, ES 222, and ES 226; and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 148 indicated the presence of Cs-137 concentrations exceeding the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. Approximately 27 cubic yards of soil were remediated from TU 148 based on a subset of characterization and bias sample results exceeding the release criterion for Ra-226. Additionally, two characterization sample results exceeded the release criterion for Cs-137, which also contributed to the removal of 9 of the 27 cubic yards of soil removed from TU 148. A total of 109 samples was collected from TU 148: 72 characterization samples, 19 biased samples to confirm successful removal of soil with concentrations of Ra-226 above the release criterion (a subset [eight] of these biased samples was collected to also confirm the successful removal of soil with concentrations of Cs-137 above the release criterion), and a set of 18 final systematic samples.

Data from TU 148 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 148 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- At least one worker who collected data at TU 148 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 148 indicated that "no additional biased sampling was performed since the bottom of the trench was native serpentine rock", as an explanation for not collecting biased samples in response to elevated concentrations reported in piping removed from TU 148. However, no issue was noted about the ability to collect multiple sets of characterization, biased, and final systematic samples. Additionally, the gamma scan range provided in the SUPR for TU 148 was 3,690 to 11,190 cpm. The SUPR stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 148 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 150

Trench Survey Unit 150 is the net sum of TU 150; excavated soil from ES 228, ES 232, and ES 233; and a volume of import fill material, which was used for backfill. TU 150 is located in Parcels UC-1 and UC-2. Sediment samples collected from piping removed from TU 150 showed elevated Cs-137 concentrations above the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. Approximately 15 cubic yards of soil were remediated from TU 150 based on a subset of characterization and bias sample results exceeding the release criterion for Ra-226. A total of 43 samples was collected from TU 150: 18 characterization samples, 7 biased samples to confirm the successful removal of soil with concentrations of Ra-226 above the release criterion, and a set of 18 final systematic samples.

Data from TU 150 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 150 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 150.
- At least one worker who collected data at TU 150 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 150 indicated that "no additional biased sampling was performed since the bottom of the trench was native serpentine rock", as an explanation for not collecting biased samples in response to elevated concentrations reported in the piping removed from TU 148. However, no issue was noted about the ability to collect the characterization, biased, and final systematic samples. Additionally, the gamma scan range provided in the SUPR for TU 150 was 3,470 to 7,160 cpm. The SUPR stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 150 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 164

Trench Survey Unit 164 is the net sum of TU 164, excavated soil from ES 267, and a volume of import fill material, which was used for backfill. Approximately 1 cubic yard of soil was remediated from TU 164 based on a subset of characterization and biased sample results exceeding the release criterion for Ra-226. A total of 39 samples was collected from TU 164: 18 characterization samples, 3 biased samples

to confirm the successful removal of soil with concentrations of Ra-226 above the release criterion, and a set of 18 final systematic samples.

Data from TU 164 were flagged as unusual or suspect for the following reason:

- Statistical tests identified significant differences between the TU 164 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.

The gamma scan range provided in the SUPR for TU 164 was 4,110 to 7,540 cpm. The SUPR for TU 164 stated that the gamma scan data exceeded the investigation level (6,712 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, biased samples were collected in response to elevated characterization sample results and subsequent remediation, but no additional surveys were performed in response to the elevated gamma scan measurements. This is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 167

Trench Survey Unit 167 is the net sum of TU 167 and a volume of import fill material, which was used for backfill. No remediation was performed at TU 167, and a set of 18 final systematic samples was collected.

Data from TU 167 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 167 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 167.

The gamma scan range provided in the SUPR for TU 167 was 3,880 to 7,670 cpm. The SUPR for TU 167 stated that the gamma scan data exceeded the investigation level (6,712 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no biased samples were collected. This is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 168

Trench Survey Unit 168 is the net sum of TU 168, excavated soil from ES 272 and ES 276, and a volume of import fill, which was used for backfill. Approximately 3 cubic yards of soil were remediated from TU 168 based on 1 characterization sample result exceeding the release criterion for Cs-137. A total of 49 samples was collected from TU 168: 18 characterization samples, 10 biased samples (no explanation was provided for the collection of these samples), 3 biased samples to confirm the successful removal of soil with concentrations of Cs-137 above the release criterion, and a set of 18 final systematic samples.

Data from TU 168 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 168 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 168.

Final systematic samples displayed characteristics that indicated the potential for two different data populations in the data set, where one subset included Ac-228, Bi-214, and K-40 concentrations that were significantly lower than the Ac-228, Bi-214, and K-40 concentrations of the other subset. Additionally, the SUPR for TU 168 stated that the gamma scan data did not exceed the investigation level (6,712 cpm). However, the gamma scan range reported in the SUPR for TU 168 was 2,980 to 8,790 cpm. Although some remediation occurred at the trench unit, the gamma scan was performed after the remediation was completed. The reported results provided in the SUPR are an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present.

The results of the evaluation indicate that the final systematic sample results from TU 168 are suspect. Therefore, it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 171

Trench Survey Unit 171 is the net sum of TU 171 and a volume of import fill material, which was used for backfill. One sediment sample collected from piping removed from TU 171 showed elevated Cs-137 concentrations above the release criterion. Approximately 3 cubic yards of soil were remediated from TU 171 based on 1 characterization sample exceeding the release criterion for Cs-137. A total of 57 samples was collected from TU 171, 36 characterization samples, 3 biased samples to confirm the successful removal of soil with concentrations of Cs-137 above the release criterion, and a set of 18 final systematic samples.

Data from TU 171 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 171 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 171.

Final systematic samples displayed characteristics that are inconsistent with final systematic sample results from Parcels UC-1, UC-2, and UC-3. The statistical tests indicated that the Ac-228, Bi-214, K-40, Pb-212, Pb-214, and Ra-226 final systematic sample results were significantly lower than the respective final systematic sample results from Parcels UC-1, UC-2, and UC-3. Additionally, the distribution of Ac-228 and K-40 sample results from TU 171 displayed an unusually low sample variance.

The results of the evaluation indicate that the final systematic sample results from TU 171 are suspect. Therefore, it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

4.2.2 Fill Units

There were 26 fill units evaluated in Parcel UC-1. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at 12 fill units; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at 14 fill units used as backfill for 8 trench survey units, and confirmation sampling is recommended. Of the 14 fill units, 14 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 1 of the 14 fill units recommended for confirmation sampling had other inconsistencies and unusual findings reported during the evaluation. The results of the Parcel UC-1 fill unit evaluation are presented on **Figure 4-6**. The data evaluation forms documenting findings are provided in **Appendix C**.

The following text summarizes the evaluations of the 14 fill units where evidence of potential data manipulation or falsification was found.

4.2.2.1 Recommended for Confirmation Sampling

Excavated Soil Unit 179

ES 179 was used to backfill TU 146. Soil used to create ES 179 originated from TU 133. The text in the SUPR for TU 146 reported that "the gamma scan of ES 179 identified measurements above the investigation level"; however, no elevated concentrations in soil were reported. No remediation was performed at ES 179, and a total of 21 samples was collected from ES 179: 3 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 179 were flagged as unusual or suspect for the following reason:

- Statistical tests identified significant differences between the ES 179 final systematic data and other excavated soil units used to backfill TU 146, and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.

The final systematic sample results from ES 179 were inconsistent with sample results from the original trench unit (TU 133), in that the concentrations of radionuclides in the Ra-226 decay series (Bi-214 and Pb-214) and Th-232 decay series (Ac-228, Bi-212, and Pb-212) from samples in ES 179 were much lower than the respective radionuclide concentrations from samples in TU 133. Additionally, although the text in the SUPR for TU 146 reported that elevated gamma scan measurements were identified for ES 179, review of the gamma scan results did not identify any elevated results. The maximum gamma scan measurement reported in the SUPR was 1,147 counts per second (cps) and below the investigation level (1,215 cps). Biased samples were collected based on the statement provided in the text in the SUPR; however, evaluation of the data does not support this statement.

The results of the evaluation indicate that the sample results from ES 179 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Units 178, 179, 183, 184, 187, 189, 190, 198, 200, 224, 227, 232, 267, and 276

The gamma scan for 14 excavated soil units in Parcel UC-1 identified several measurements above the investigation level, which prompted the collection of biased soil samples in addition to the standard 18 final systematic samples. However, none of these biased sample results identified activity above the release criteria for any ROC. The concern is that the biased samples were not collected at the locations of the highest gamma scan measurement. This narrative is consistent with the allegation that biased samples were collected in areas to avoid potentially elevated soil sample results. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions at fill units ES 178, ES 179, ES 183, ES 184, ES 187, ES 189, ES 190, ES 198, ES 200, ES 224, ES 227, ES 232, ES 267, and ES 276. In addition, ES 179 had other inconsistencies and unusual findings described in the previous section.

4.3 Parcel UC-2

The areas evaluated in Parcel UC-2 included 8 trench units and 20 fill units. Analytical results for more than 1,000 soil samples were evaluated. The areas evaluated in Parcel UC-2 are presented on **Figure 4-7** and consist of samples collected in 2009.

4.3.1 Trench Units

There were eight trench units evaluated in Parcel UC-2. Based upon the scope of this evaluation, there was evidence of potential data manipulation or falsification at the eight trench units evaluated, and

confirmation sampling is recommended. The results of the Parcel UC-2 trench unit evaluation are presented on **Figure 4-8**. The data evaluation forms documenting the findings are provided in **Appendix C**.

The following text summarizes the evaluations of the eight trench units where evidence of potential data manipulation or falsification was found.

4.3.1.1 Recommended for Confirmation Sampling

Trench Unit 136

Trench Unit 136 is the net sum of TU 136; excavated soil from ES 193, ES 194, ES 196, ES 197, ES 202, and ES 203; and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 136 showed elevated Ra-226 concentrations above the release criterion. Approximately 190 cubic yards of soil were remediated from TU 136 based on a subset of characterization and biased samples exceeding the release criterion for Ra-226. A total of 132 samples was collected from TU 136: 72 characterization samples, 42 biased samples to confirm the successful removal of soil with concentrations of Ra-226 above the release criterion, and a set of 18 final systematic samples.

Data from TU 136 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 136 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 136.
- At least one worker who collected data at TU 136 was mentioned in one or more allegations of wrongdoing.

The gamma scan range provided in the SUPR for TU 136 was 3,190 to 13,600 cpm. The SUPR for TU 136 stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, biased samples were collected in response to elevated characterization sample results and subsequent remediation, but no additional surveys were performed in response to the elevated gamma scan measurements. Additionally, no biased samples were collected in response to the elevated concentrations reported in the piping removed from TU 136, and no explanation is provided in the SUPR. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 136 and elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 137

Trench Survey Unit 137 is the net sum of TU 137; excavated soil from ES 191, ES 192, ES 195, and ES 201; and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 137 showed elevated Cs-137 concentrations above the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. No remediation was performed at TU 137, and a set of 18 final systematic samples was collected.

Data from TU 137 were flagged as unusual or suspect for the following reason:

- At least one worker who collected data at TU 137 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 137 indicated that "no additional biased sampling was performed since the bottom of the trench was native serpentine rock", as an explanation for not collecting biased samples in response to elevated concentrations reported in piping removed from TU 137. However, no issue was noted about the ability to collect the final systematic samples. Additionally, the gamma scan range provided in the SUPR for TU 137 was 1,090 to 14,500 cpm. The SUPR stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 137 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 138

Trench Survey Unit 138 is the net sum of TU 138; excavated soil from ES 207, ES 208, and ES 209; and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 138 showed elevated Cs-137 concentrations exceeding the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. Additionally, one sediment sample collected from a manhole excavated from TU 138 showed elevated Ra-226 concentrations exceeding the release criterion; however, no elevated Ra-226 concentrations were reported in soil sample results. No remediation was performed at TU 138, and a set of 18 final systematic samples was collected.

Data from TU 138 were flagged as unusual or suspect for the following reason:

- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 138.

The gamma scan range provided in the SUPR for TU 138 was 1,160 to 15,210 cpm. The SUPR for TU 138 stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, biased samples were collected in response to elevated characterization sample results and subsequent remediation, but no additional surveys were performed in response to the elevated gamma scan measurements. Additionally, no biased samples were collected in response to the elevated concentrations reported in the piping removed from TU 138, and no explanation is provided in the SUPR. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 138 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 141

Trench Survey Unit 141 is the net sum of TU 141; excavated soil from ES 211, ES 214, and ES 215; and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 141 showed elevated Cs-137 concentrations above the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. No remediation was performed at TU 141, and a set of 18 final systematic samples was collected.

Data from TU 141 were flagged as unusual or suspect for the following reasons:

- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 141.
- At least one worker who collected data at TU 141 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 141 indicated that "no additional biased sampling was performed since the bottom of the trench was native serpentine rock", as an explanation for not collecting biased samples in response to elevated concentrations reported in piping removed from TU 141. However, no issue was noted about the ability to collect the final systematic samples. Additionally, the gamma scan range provided in the SUPR for TU 141 was 1,090 to 14,500 cpm.

The SUPR stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 141 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 142

Trench Survey Unit 142 is the net sum of TU 142, excavated soil from ES 216 and ES 217, and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 142 showed elevated Cs-137 concentrations above the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. No remediation was performed at TU 142, and a set of 18 final systematic samples was collected.

Data from TU 142 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 142 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 142.
- At least one worker who collected data at TU 142 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 142 indicated that "no additional biased sampling was performed since the bottom of the trench was native serpentine rock", as an explanation for not collecting biased samples in response to elevated concentrations reported in piping removed from TU 142. However, no issue was noted about the ability to collect the final systematic samples. Additionally, the gamma scan range provided in the SUPR for TU 142 was 3,820 to 9,090 cpm. The SUPR stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 142 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 144

Trench Survey Unit 144 is the net sum of TU 144 and excavated soil from ES 210, which was used for backfill. One sediment sample collected from piping removed from TU 144 showed elevated Ra-226 concentrations above the release criterion; however, no elevated Ra-226 concentrations were reported in soil sample results. No remediation was performed at TU 144, and a total of 24 samples was collected from TU 144: 6 biased samples to identify potential elevated Ra-226 concentrations in soil and a set of 18 final systematic samples.

Data from TU 144 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 144 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- At least one worker who collected data at TU 144 was mentioned in one or more allegations of wrongdoing.

The gamma scan range provided in the SUPR for TU 144 was 4,630 to 7,510 cpm. The SUPR for TU 144 stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. This is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present. Additionally, all of the gamma static measurements reported in the SUPR are below the lower range of the gamma scan results and do not appear to be representative of field survey measurements. It is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 145

Trench Survey Unit 145 is the net sum of TU 145, excavated soil from ES 212, and a volume of import fill material, which was used for backfill. No remediation was performed at TU 145, and a set of 18 final systematic samples was collected.

Data from TU 145 were flagged as unusual or suspect for the following reasons:

- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 145.
- At least one worker who collected data at TU 145 was mentioned in one or more allegations of wrongdoing.

The gamma scan range provided in the SUPR for TU 145 was 4,630 to 7,570 cpm. The SUPR for TU 145 stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. This is an indication that the survey activity apparently failed to respond to elevated gamma scan results. Therefore, locations with scan measurements that exceeded the investigation level are likely still present. Additionally, all of the gamma static measurements reported in the SUPR are below the lower range of the gamma scan results and do not appear to be representative of field survey measurements. It is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 149

Trench Survey Unit 149 is the net sum of TU 149, excavated soil from ES 230, and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 149 showed elevated Cs-137 concentrations above the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. No remediation was performed at TU 149, and a set of 18 final systematic samples was collected.

Data from TU 149 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 149 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- At least one worker who collected data at TU 149 was mentioned in one or more allegations of wrongdoing.

The SUPR for TU 149 indicated that "no additional biased sampling was performed since the bottom of the trench was native serpentine rock", as an explanation for not collecting biased samples in response to elevated concentrations reported in piping removed from TU 149. However, no issue was noted about the ability to collect the final systematic samples. Additionally, the gamma scan range provided in the SUPR for TU 149 was 3,210 to 9,090 cpm. The SUPR stated that the gamma scan data exceeded the investigation level (7,013 cpm) and that additional surveys were performed. However, based on the narrative provided in the SUPR, no additional surveys were performed. These are indications that the survey activity apparently failed to respond to elevated concentrations found in the piping removed from TU 149 and elevated gamma scan results. Therefore, sample locations with potentially elevated radionuclide concentrations are likely still present, and it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

4.3.2 Fill Units

There were 20 fill units evaluated in Parcel UC-2. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at 7 fill units; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at 13 fill units used as backfill for 7 trench survey units, and confirmation sampling is recommended. Of the 13 fill units, 13 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 1 of the 13 fill units recommended for confirmation sampling reported other inconsistencies and unusual findings during the evaluation. The results of the Parcel UC-2 fill unit evaluation are presented on **Figure 4-9**. The data evaluation forms documenting findings are provided in **Appendix C**.

The following text summarizes the evaluations of the 13 fill units where evidence of potential data manipulation or falsification was found.

4.3.2.1 Recommended for Confirmation Sampling

Excavated Soil Unit 216

ES 216 was used to backfill TU 142. Soil used to create ES 216 originated from TU 142. Elevated gamma scan measurements were reported; however, no elevated soil concentrations were reported. A total of 36 samples was collected from ES 216: 18 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 216 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the ES 216 final systematic data and other overburden units used to backfill TU 142 and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Logic tests identified inconsistencies related to the processing of samples from ES 216.

Soil originating from TU 142 was used to create all or nearly all of four excavated soil units, including ES 215, ES 216, ES 217, and ES 218 (ES 218 was disposed of as non-LLRW) and it is expected the samples collected from these units would display similar characteristics. However, the final systematic samples display characteristics inconsistent with final systematic sample results for other excavated soil units with soil originating from TU 142 because the distribution of Ac-228, Bi-214, and K-40 final systematic sample results from ES 216 display an unusually low variance. Additionally, all of the final systematic samples and biased samples were collected on the same date, except for 1 biased sample, which was collected 3 days after. No explanation is provided in available documentation for this reported procedure.

The results of the evaluation indicate that the sample results from ES 216 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Units 191, 192, 202, 207, 208, 209, 210, 211, 214, 214, 215, 216, 217, and 230

The gamma scan for 13 excavated soil units in Parcel UC-2 identified several measurements above the investigation level, which prompted the collection of biased soil samples in addition to the standard 18 final systematic samples. However, none of these biased sample results identified activity above the release criteria for any ROC. In some cases, remediation was performed; however, this was only the case when elevated characterization sample results were identified. In all cases, the biased samples collected in response to elevated gamma scan measurements did not identify activity above the release criteria for any ROC. The concern is that the biased samples were not collected at the locations of the highest gamma scan measurement. This narrative is consistent with the allegation that biased samples were collected in areas to avoid potentially elevated soil sample results. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions at fill units ES 191, ES 192, ES 202, ES 207, ES 208, ES 209, ES 210, ES 211, ES 214, ES 215, ES 216, ES 217, and ES 230. In addition, ES 216 had other inconsistencies and unusual findings described in the previous section.

4.4 Parcel UC-3

The areas evaluated in Parcel UC-3 included 21 trench units and 29 fill units. Analytical results for more than 1,800 soil samples were evaluated. The areas evaluated in Parcel UC-3 are presented on **Figure 4- 10** and consist of samples collected in 2010.

4.4.1 Trench Units

There were 21 trench units evaluated in Parcel UC-3. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at 16 trench units; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining five trench units, and confirmation sampling is recommended. The results of the Parcel UC-3 trench unit evaluation are presented on **Figure 4-11**. The data evaluation forms documenting the findings are provided in **Appendix C**.

The following text summarizes the evaluations of the five trench units where evidence of potential data manipulation or falsification was found.

4.4.1.1 Recommended for Confirmation Sampling

Trench Unit 166

Trench Survey Unit 166 is the net sum of TU 166 and a volume of import fill material, which was used for backfill. Sediment samples collected from piping removed from TU 166 showed elevated Cs-137 concentrations above the release criterion; however, no elevated Cs-137 concentrations were reported in soil sample results. No remediation was performed, and a total of 24 samples was collected from TU 166: 6 biased samples to identify potential elevated radionuclide concentrations and a set of 18 final systematic samples.

Data from TU 166 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 166 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- TU 166 is located downstream from a radiologically impacted building.

The gamma scan range provided in the SUPR for TU 166 was 3,200 to 7,490 cpm. The SUPR for TU 166 stated that the gamma scan data exceeded the investigation level (6,712 cpm) and that additional surveys were performed. However, none of the biased sample results identified activity above the release criteria for any ROC. This narrative is consistent with the allegation that biased samples were collected in areas to avoid potentially elevated soil sample results. Additionally, the range of gamma static measurements is less variable than the range of gamma scan measurements. It is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 169

Trench Survey Unit 169 is the net sum of TU 169, excavated soil from ES 271, and a volume of import fill material, which was used for backfill. One sediment sample collected from piping removed from TU 169 showed an elevated Cs-137 concentration above the release criterion. Approximately 554 cubic yards of soil were remediated from TU 169 based on a subset of biased and characterization samples exceeding the release criterion for Ra-226 and Cs-137. A total of 98 samples was collected from TU 169: 36 characterization samples, 5 biased samples to identify potential elevated radionuclide concentrations in soil, 39 biased samples to confirm successful removal of Ra-226 and Cs-137 concentrations in soil, and a set of 18 final systematic samples.

Data from TU 169 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 169 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 169.
- At least one worker who collected data at TU 169 was mentioned in one or more allegations of wrongdoing.

The final systematic samples and second set of characterization samples display characteristics inconsistent with the initial set of characterization samples in that the statistical means of Ac-228, Bi-214, and K-40 concentrations from the initial set of characterization samples are significantly higher than the statistical means of Ac-228, Bi-214, and K-40 concentrations from the second set of characterization and final systematic samples. This is an indication that at least one set of systematic samples are not representative of soil from TU 169.

The results of the evaluation indicate that the sample results from TU 169 are suspect, and confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Trench Unit 175

Trench Survey Unit 175 is the net sum of TU 175, excavated soil from ES 319 and ES 329, and a volume of import fill material, which was used for backfill. Approximately 2 cubic yards of soil were remediated from TU 175 based on 1 characterization sample exceeding the release criterion for Ra-226. A total of 39 samples was collected from TU 175: 18 characterization samples, 3 biased samples to confirm the successful removal soil with concentrations of Ra-226 above the release criterion, and a set of 18 final systematic samples.

Data from TU 175 were flagged as unusual or suspect for the following reasons:

- Graphical data review identified anomalies or unusual trends in the soil sample data collected from TU 175.

- At least one worker who collected data at TU 175 was mentioned in one or more allegations of wrongdoing.

The final systematic samples display characteristics inconsistent with characterization samples, in that the statistical means and distributions of Ac-228 and Bi-214 final systematic sample results are significantly different from the statistical means and distributions of Ac-228 and Bi-214 characterization sample results. This is not expected given that only a small amount of soil (approximately 2 cubic yards) was removed from TU 175 following the collection of the characterization samples and prior to collection of the final systematic samples.

The results of the evaluation indicate that the sample results from TU 175 are suspect, and confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Trench Unit 177

Trench Survey Unit 177 is the net sum of TU 177, excavated soil from ES 313 and ES 316, and a volume of import fill material, which was used for backfill. No remediation was performed at TU 177, and a set of 18 final systematic samples was collected.

Data from TU 177 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 177 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 177.
- TU 177 is located downstream from a radiologically impacted building.

The final systematic samples display characteristics inconsistent with final systematic sample results from Parcels UC-1, UC-2, and UC-3, in that the distribution of Ac-228 and Bi-214 concentrations from TU 177 are unusually low. Additionally, the final systematic sample results display characteristics of at least two different data populations for K-40. The final systematic sample results from TU 177 were compared to final systematic sample results from the adjacent trench unit (TU 178) to identify potential similarities in results from geographically similar soils; however, inconsistencies were observed in data from the adjacent trench unit. Furthermore, there were inconsistencies observed between the gamma static and gamma scan measurements.

The results of the evaluation indicate that the final systematic sample results from TU 177 are suspect. Therefore, it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

Trench Unit 190

Trench Survey Unit 190 is the net sum of TU 190, excavated soil from ES 312, and a volume of import fill material, which was used for backfill. No remediation was performed at TU 190, and a total of 22 samples was collected from TU 190: 4 biased samples and a set of 18 final systematic samples.

Data from TU 190 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the TU 190 final systematic data and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Logic tests identified inconsistencies related to the processing of samples from TU 190.
- Graphical data review identified anomalies or unusual trends in soil sample data collected from TU 190.

- At least one worker who collected data at TU 190 was mentioned in one or more allegations of wrongdoing.

The final systematic samples display characteristics inconsistent with final systematic samples from Parcels UC-1, UC-2, and UC-3 because the K-40 final systematic sample results from TU 190 display an unusually low sample variance. Additionally, several unusually low Ac-228, Bi-214, and K-40 sample results were reported. The final systematic sample results from TU 190 were compared to final systematic sample results from adjacent trench units (TU 169 and TU 180) to identify potential similarities in results from geographically similar soils; however, inconsistencies were observed in data from the adjacent trench units, and the sample results from TU 169 are suspect. Furthermore, the text in the SUPR for TU 190 stated that no additional samples were collected; however, sample results for four biased samples were included in the SUPR.

The results of the evaluation indicate that the final systematic sample results from TU 190 are suspect. Therefore, it is recommended that confirmation sampling and analysis by an independent, certified laboratory be performed to document current site conditions.

4.4.2 Fill Units

There were 29 fill units evaluated in Parcel UC-3. Based upon the scope of this evaluation, there was no evidence of potential data manipulation or falsification at five fill units; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at 24 fill units used as backfill for 14 trench survey units, and confirmation sampling is recommended. Of the 24 fill units, 24 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 6 of the 24 fill units recommended for confirmation sampling reported other inconsistencies and unusual findings during the evaluation. The results of the Parcel UC-3 fill unit evaluation are presented on **Figure 4-12**. The data evaluation forms documenting findings are provided in **Appendix C**.

The following text summarizes the evaluations of the 24 fill units where evidence of potential data manipulation or falsification was found.

4.4.2.1 Recommended for Confirmation Sampling

Excavated Soil Unit 294

ES 294 was used to backfill TU 174. Soil used to create ES 294 originated from TU 174. Elevated gamma scan measurements were reported, which prompted the collection of biased samples. The SUPR for TU 174 indicated that one characterization sample exceeded the release criterion for Ra-226; however, the amount of soil remediated from ES 294 was not specifically provided in the SUPR. A total of 54 samples was collected from ES 294: 18 characterization samples, 14 biased samples to identify potential elevated radionuclide concentrations in soil, 4 biased samples to confirm the successful removal of soil with concentrations of Ra-226 above the release criterion, and a set of 18 final systematic samples.

Data from ES 294 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the ES 294 final systematic data and other excavated soil units used to backfill TU 174 and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Logic tests identified inconsistencies related to the processing of samples from ES 294.
- Graphical data review identified anomalies or unusual trends in the soil sample data collected from ES 294.

- Soil used to create ES 294 originated from trench units downstream from a radiologically impacted building.

The final systematic samples display characteristics inconsistent with characterization samples because the final systematic Ac-228 and Bi-214 sample results display a lower variability compared to the biased samples. Additionally, the final systematic samples display characteristics that indicated the potential for two different data populations in the data set, where one subset included Ac-228 and Bi-214 concentrations that were significantly lower than the Ac-228 and Bi-214 concentrations of the other subset. The sampling map from ES 294 provided in the SUPR for TU 174 indicated that a minimal amount of soil was removed from the RSY pad for ES 294, and the change in final systematic sample data distributions is not expected based on the removal of this amount of soil. Furthermore, final systematic samples were not analyzed until 48 days after sample collection. No explanation is provided in available documentation for this reported procedure.

The evaluation indicates that the sample results from ES 294 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Unit 295

ES 295 was used to backfill TU 174. Soil used to create ES 295 originated from TU 194, TU 183, and TU 184. The text in the SUPR for TU 174 reported the following: “The gamma scan of ES 295 identified measurements above the investigation level”; however, no elevated concentrations in soil were reported. No remediation was performed at ES 295, and a total of 20 samples was collected from ES 295: 2 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 295 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the ES 295 final systematic data and other excavated soil units used to backfill TU 174, and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Logic tests identified inconsistencies related to the processing of samples from ES 295.
- Graphical data review identified anomalies or unusual trends in the soil sample data collected from ES 295.
- Soil used to create ES 295 originated from trench units downstream from a radiologically impacted building.

The final systematic samples displayed characteristics inconsistent with other final systematic samples from Parcels UC-1, UC-2, and UC-3, and several unusually low Ac-228 sample results were reported. Additionally, although the text in the SUPR for TU 174 reported that elevated gamma scan measurements were identified for ES 295, review of the gamma scan results did not identify any elevated results. The maximum gamma scan measurement reported in the SUPR of 1,192 cps was below the investigation level (1,215 cps). Biased samples were collected based on the statement provided in the text in the SUPR; however, evaluation of the data does not support this statement. Furthermore, final systematic samples were analyzed 22 days after sample collection. No explanation is provided in available documentation for this reported procedure.

The evaluation indicates that the sample results from TU 295 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Unit 296

ES 296 was used to backfill TU 179. Soil used to create ES 296 originated from TU 175. Elevated gamma scan measurements were reported; however, no elevated concentrations in soil were reported. A total of 36 samples was collected from TU 296: 18 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 296 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the ES 296 final systematic data and other excavated soil units used to backfill TU 179, and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Logic tests identified inconsistencies related to the processing of samples from ES 296.
- Graphical data review identified anomalies or unusual trends in the soil sample data collected from ES 296.

Final systematic samples and biased samples were collected on the same day. However, final systematic samples were analyzed over a span of 2 days, and a subset of the biased samples was analyzed after the analysis of all final systematic samples. No explanation is provided in available documentation for this reported procedure.

The results of the evaluation indicate that the sample results from ES 296 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Unit 297

ES 297 was used to backfill TU 179. Soil used to create ES 297 originated from TU 175. Elevated gamma scan measurements were reported; however, no elevated concentrations in soil were reported. A total of 36 samples was collected from TU 297: 18 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 297 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the ES 297 final systematic data and other excavated soil units used to backfill TU 179, and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Graphical data review identified anomalies or unusual trends in the soil sample data collected from ES 297.

Final systematic samples and biased samples were collected on the same day. However, all final systematic samples were analyzed prior to the analysis of the biased samples. No explanation is provided in available documentation for this reported procedure.

The evaluation indicates that the sample results from ES 297 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Unit 300

ES 300 was used to backfill TU 176. Soil used to create ES 300 originated from TU 173 and TU 176. Elevated gamma scan measurements were reported; however, no elevated concentrations in soil were reported. A total of 32 samples was collected from TU 300: 14 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 300 were flagged as unusual or suspect for the following reason:

- Statistical tests identified significant differences between the ES 300 final systematic data and other excavated soil units used to backfill TU 176, and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.

Final systematic samples and biased samples were collected on the same day. However, final systematic samples were analyzed over a span of 2 days, and a subset of the biased samples was analyzed after the analysis of all final systematic samples. No explanation is provided in available documentation for this reported procedure.

The evaluation indicates that the sample results from TU 300 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Unit 326

ES 326 was used to backfill TU 184. Soil used to create ES 326 originated from TU 184 and TU 187. The text in the SUPR for TU 184 reported that "the gamma scan of ES 326 identified measurements above the investigation level"; however, no elevated concentrations in soil were reported. No remediation was performed at ES 326, and a total of 20 samples was collected from ES 326: 2 biased samples to identify potential elevated radionuclide concentrations in soil and a set of 18 final systematic samples.

Data from ES 326 were flagged as unusual or suspect for the following reasons:

- Statistical tests identified significant differences between the ES 326 final systematic data and other excavated soil units used to backfill TU 184, and other final systematic data collected from Parcels UC-1, UC-2, and UC-3.
- Logic tests identified inconsistencies related to the processing of samples from ES 326.
- Graphical data review identified anomalies or unusual trends in the soil sample data collected from ES 326.
- Soil used to create ES 326 originated from trench units downstream from a radiologically impacted building.

Although the text in the SUPR for TU 184 reported that elevated gamma scan measurements were identified for ES 326, review of the gamma scan results did not identify any elevated results. The maximum gamma scan measurement reported in the SUPR of 1,186 cps was below the investigation level (1,215 cps). Biased samples were collected based on the statement provided in the text in the SUPR; however, evaluation of the data does not support this statement. Furthermore, final systematic samples were analyzed almost 4 weeks after sample collection, and the analysis of the final systematic samples spanned a period of 12 days. No explanation is provided in available documentation for this reported procedure.

The evaluation indicates that the sample results from TU 326 are suspect. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions.

Excavated Soil Units 288, 293, 294, 295, 296, 297, 298, 299, 300, 303, 305, 307, 309, 310, 312, 313, 315, 316, 318, 319, 320, 322, 323, and 326

The gamma scan for 24 excavated soil units in Parcel UC-3 identified several measurements above the investigation level, which prompted the collection of biased soil samples in addition to the standard 18 final systematic samples. However, none of these biased sample results identified activity above the release criteria for any ROC. In some cases, remediation was performed; however, this was only the case when elevated characterization sample results were identified. In all cases, the biased samples collected in response to elevated gamma scan measurements did not identify activity above the release criteria

for any ROC. The concern is that the biased samples were not collected at the locations of the highest gamma scan measurement. This narrative is consistent with the allegation that biased samples were collected in areas to avoid potentially elevated soil sample results. Therefore, confirmation sampling and analysis by an independent, certified laboratory are recommended to document current site conditions at fill units ES 288, ES 293, ES 294, ES 295, ES 296, ES 297, ES 298, ES 299, ES 300, ES 303, ES 305, ES 307, ES 309, ES 310, ES 312, ES 313, ES 315, ES 316, ES 318, ES 319, ES 320, ES 322, ES 323, and ES 326. In addition, ES 294, ES 295, ES 296, ES 297, ES 300, and ES 326 had other inconsistencies and unusual findings described in the previous sections.

4.5 Conclusions and Recommendations

This evaluation of Parcels D-2, UC-1, UC-2, and UC-3 soil data found evidence that potential manipulation and falsification was not limited to the survey units addressed by TtEC in their *Investigation Conclusion, Anomalous Soil Samples* report (TtEC, 2014). Subsequently, former workers at HPNS alleged additional and more widespread data manipulation and falsification.

The areas evaluated in Parcel D-2 included seven trench units and five fill units. More than 400 soil samples were collected from these areas from 2006 through 2009. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

- Trench units - There was no evidence of potential data manipulation or falsification identified at six of the seven trench units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining trench unit, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at one of the five fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining four fill units used as backfill for four trench survey units, and confirmation sampling is recommended. Of the four fill units, four were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements.

The areas evaluated in Parcel UC-1 included 12 trench units and 25 fill units. More than 1,600 soil samples were collected from these areas from 2009 through 2010. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

- Trench units - There was no evidence of potential data manipulation or falsification identified at 3 of the 12 trench units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining nine trench units, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at 12 of the 26 fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining 14 fill units used as backfill for 8 trench survey units, and confirmation sampling is recommended. Of the 14 fill units, 14 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 1 of the 14 fill units recommended for confirmation sampling had other inconsistencies and unusual findings reported during the evaluation.

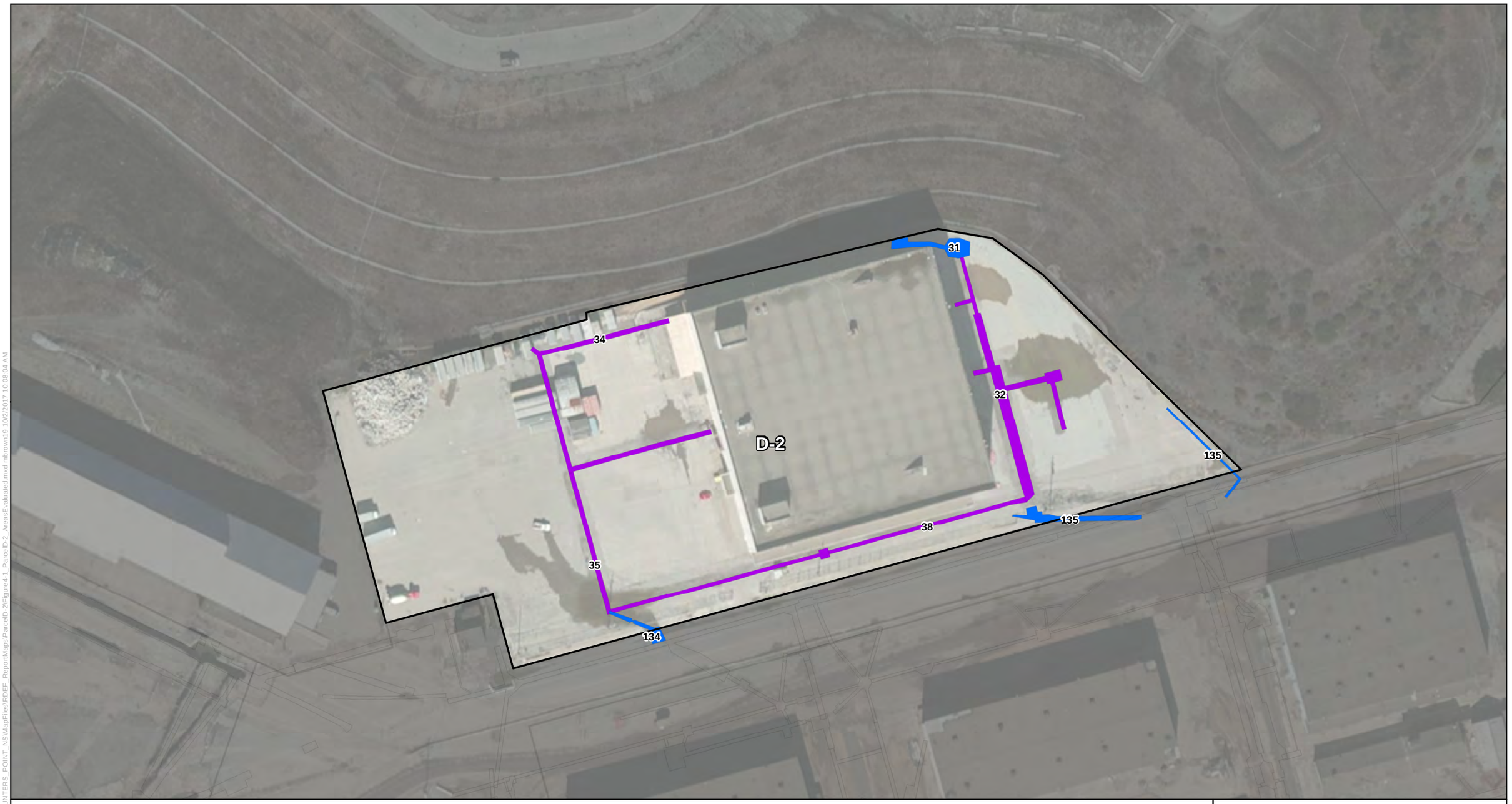
The areas evaluated in Parcel UC-2 included 8 trench units and 20 fill units. More than 1,000 soil samples were collected from these areas in 2009. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

- Trench units - There was evidence of potential data manipulation or falsification at the eight trench units evaluated, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at 7 of the 20 fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining 13 fill units used as backfill for 7 trench survey units, and confirmation sampling is recommended. Of the 13 fill units, 13 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 1 of the 13 fill units recommended for confirmation sampling reported other inconsistencies and unusual findings during the evaluation.

The areas evaluated in Parcel UC-3 included 21 trench units and 29 fill units. More than 1,800 soil samples were collected from these areas in 2010. Based solely on a review of the data previously collected by TtEC and the findings of the data evaluations, the following recommendations are provided:

- Trench units - There was no evidence of potential data manipulation or falsification identified at 16 of the 21 trench units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining five trench units, and confirmation sampling is recommended.
- Fill units - There was no evidence of potential data manipulation or falsification identified at 5 of the 29 fill units evaluated; therefore, no further action is recommended. There was evidence of potential data manipulation or falsification at the remaining 24 fill units used as backfill for 14 trench survey units, and confirmation sampling is recommended. Of the 24 fill units, 24 were recommended for confirmation sampling based on evidence of biased sample collection at locations to potentially avoid the highest gamma scan measurements. In addition, 6 of the 24 fill units recommended for confirmation sampling reported other inconsistencies and unusual findings during the evaluation.

Because the Navy cannot provide assurance that the evaluation identified every instance of potential data manipulation or falsification, it is recommended that the Navy and regulatory agencies work collaboratively to initiate a sample collection program to confirm protectiveness of human health and the environment. The sampling program should be based on the findings of this report and consider that naturally occurring Ra-226 may exceed the release criterion without being indicative of site-related contamination.



Legend:

- Trench Unit
- Trench and Fill Unit
- Parcel D-2

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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1 inch = 100 feet

Figure 4-1
Areas Evaluated in Parcel D-2
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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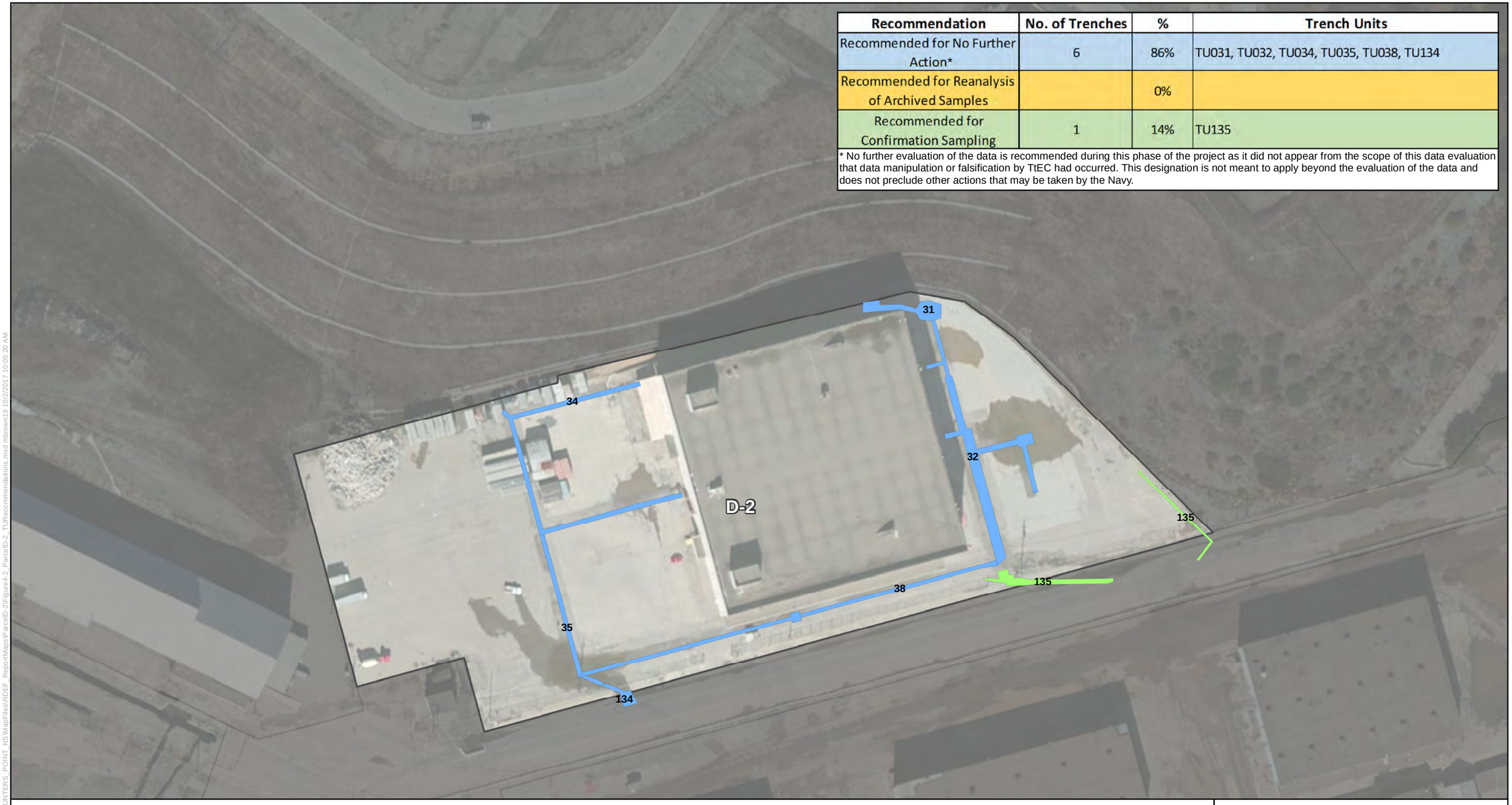
Recommendation	No. of Trenches	%	Trench Units
Recommended for No Further Action*	6	86%	TU031, TU032, TU034, TU035, TU038, TU134
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	1	14%	TU135

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.



Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel D-2

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 4-2
Parcel D-2 Trench Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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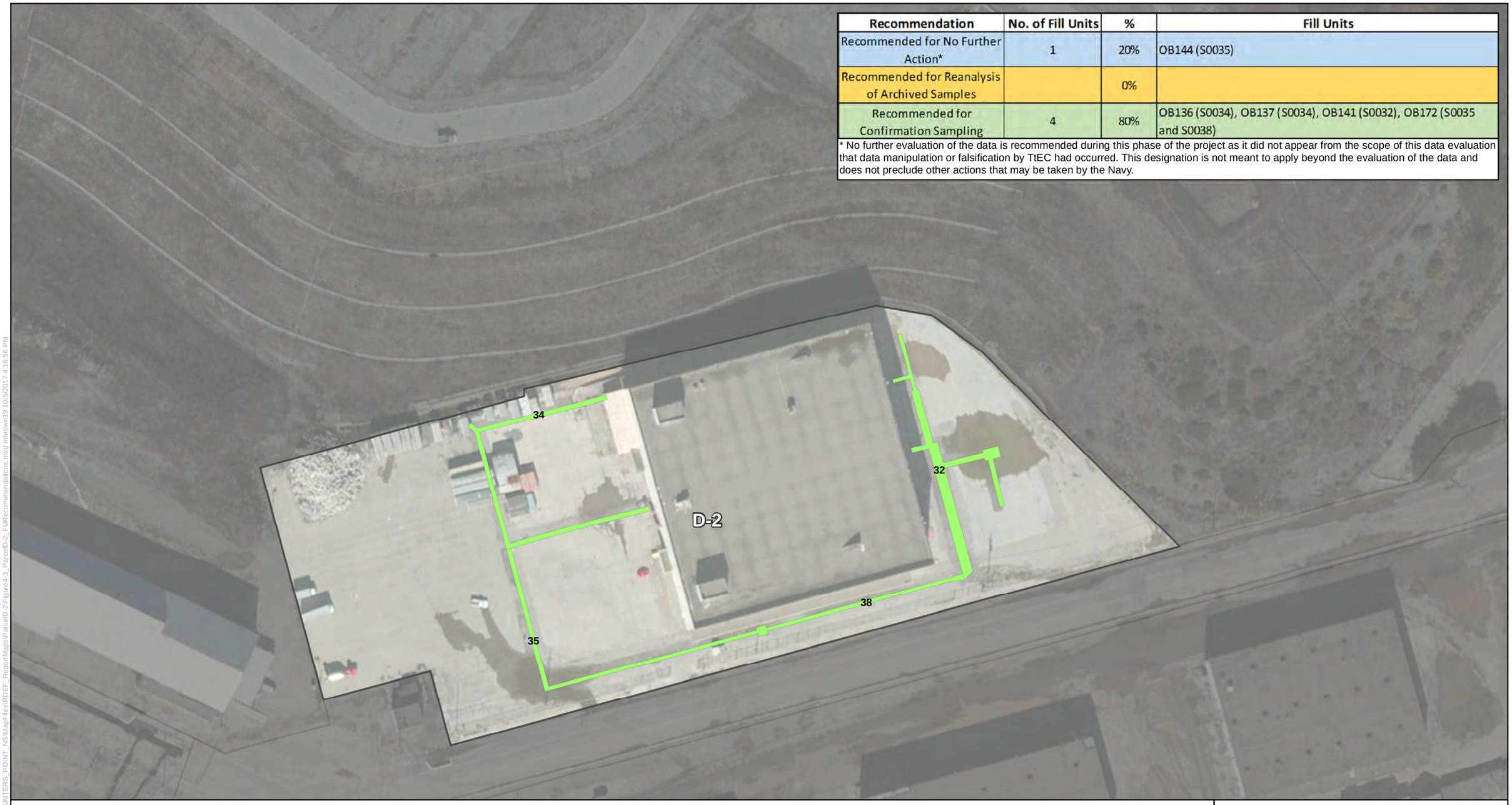
Recommendation	No. of Fill Units	%	Fill Units
Recommended for No Further Action*	1	20%	OB144 (S0035)
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	4	80%	OB136 (S0034), OB137 (S0034), OB141 (S0032), OB172 (S0035 and S0038)

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.



Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel D-2

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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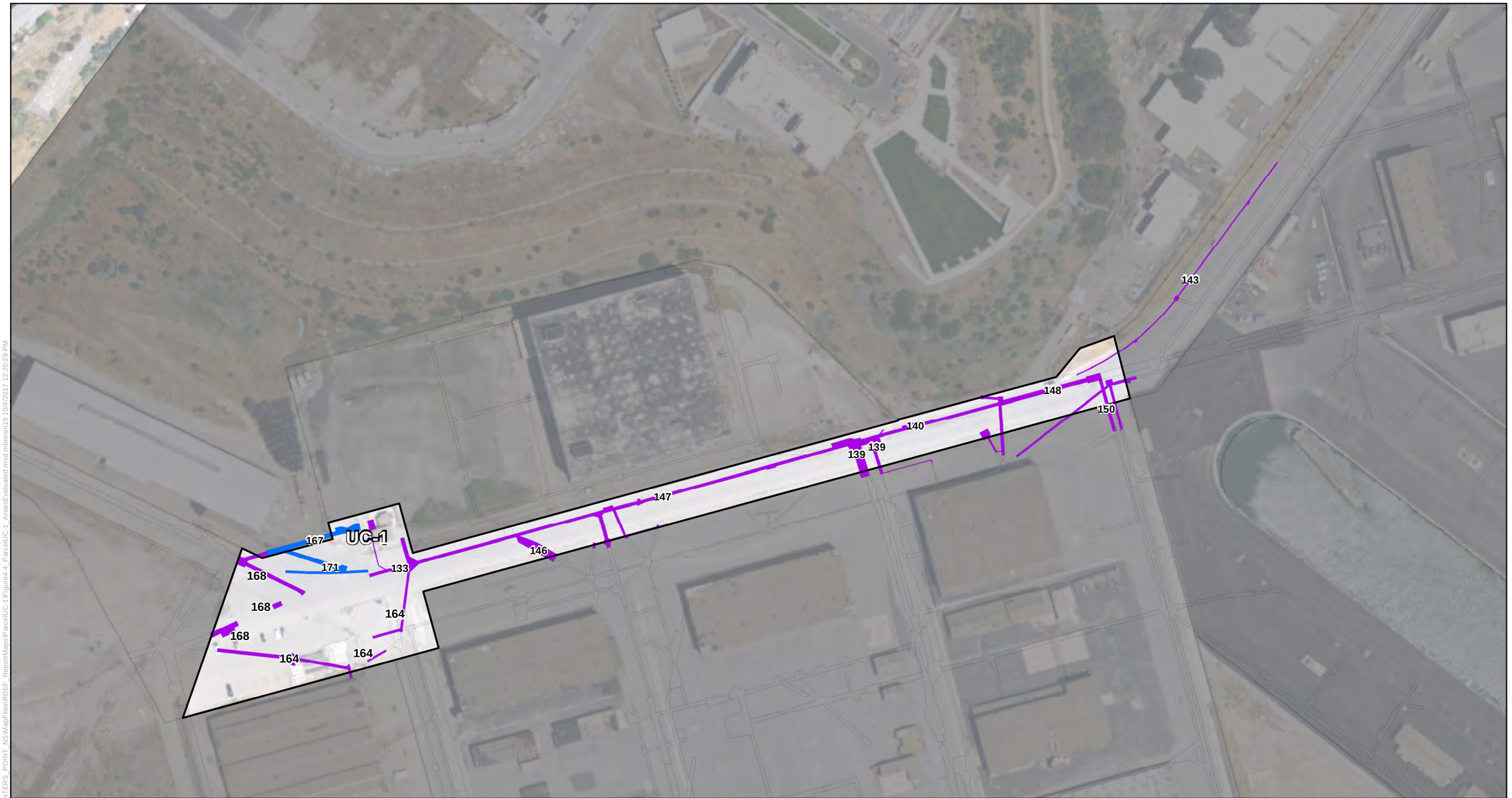
1 inch = 100 feet

Figure 4-3
Parcel D-2 Fill Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California



Legend:

- Trench Unit
- Trench and Fill Unit
- Parcel UC-1

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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1 inch = 150 feet

Figure 4-4
Areas Evaluated in Parcel UC-1
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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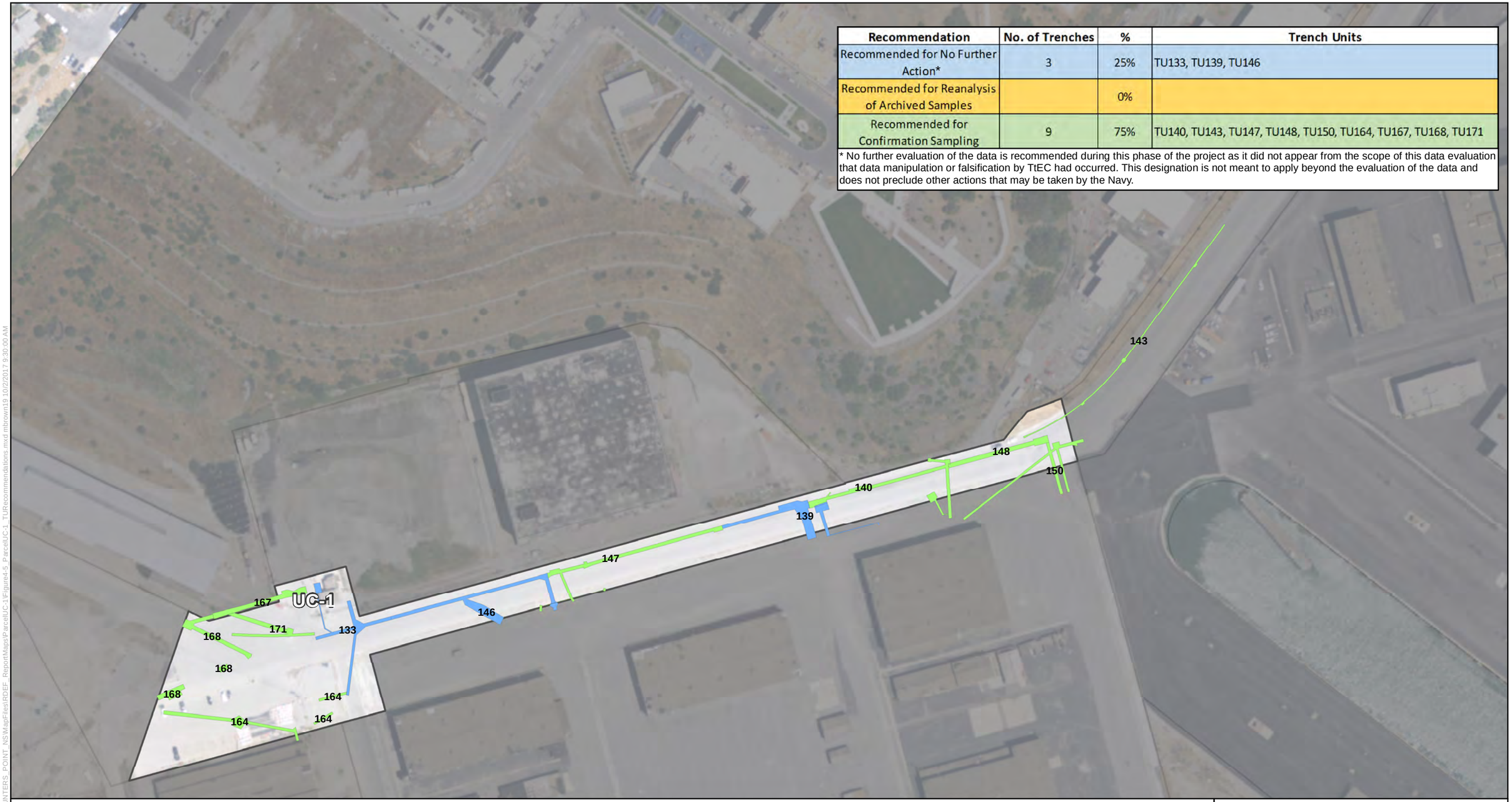
Recommendation	No. of Trenches	%	Trench Units
Recommended for No Further Action*	3	25%	TU133, TU139, TU146
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	9	75%	TU140, TU143, TU147, TU148, TU150, TU164, TU167, TU168, TU171

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.



Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel UC-1

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 75 150 300 Feet

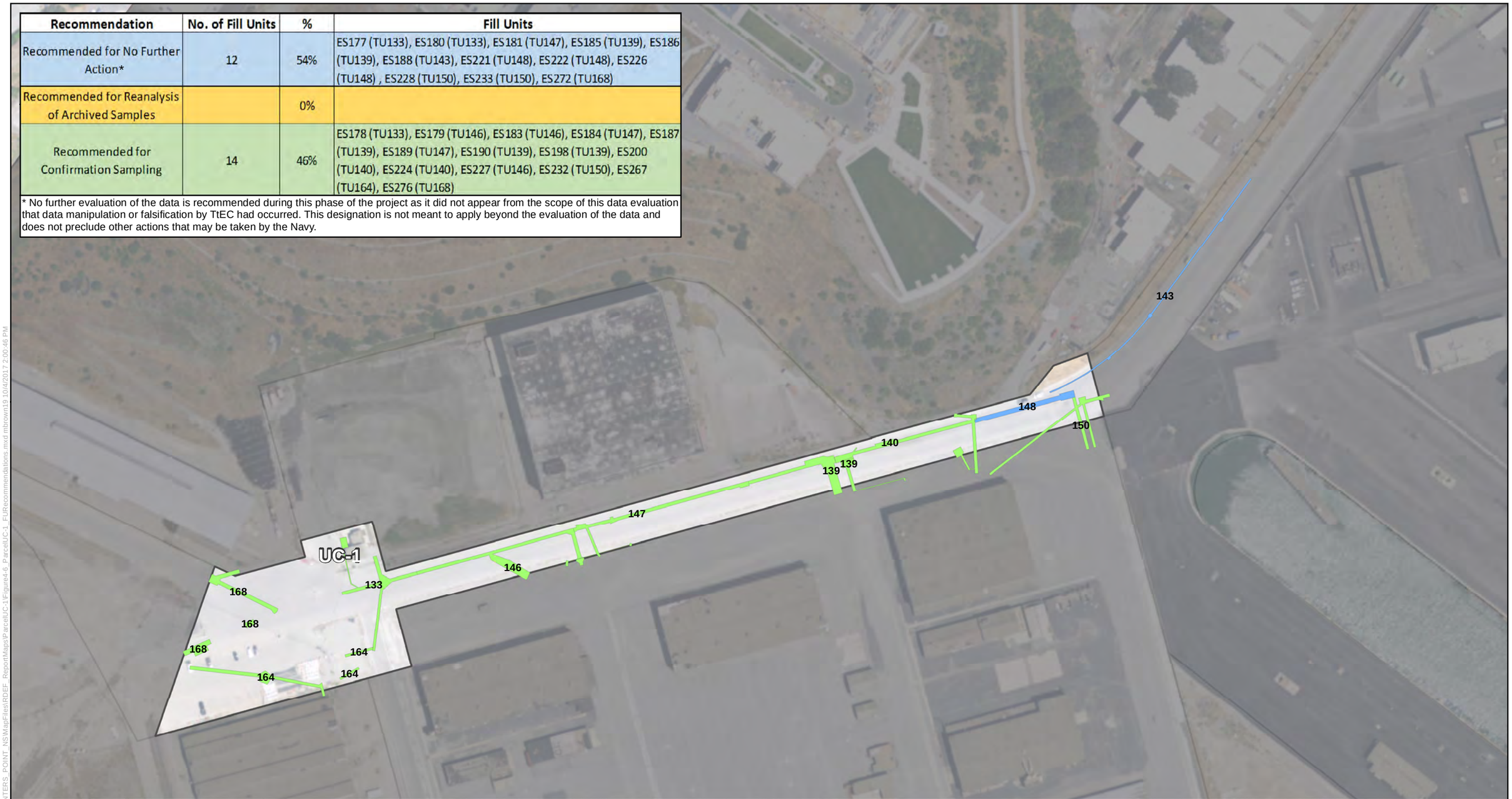
1 inch = 150 feet

Figure 4-5
Parcel UC-1 Trench Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

R:\ENBG\00_Proj\NNavy\CLEAN\SOUTHWEST\HUNTERS_POINT_NSY\MapFiles\RDEF_ReportMaps\Parcel\UC-1\Figure4-5_ParcelUC-1_TURecommendations.mxd mbrown13 10/2/2017 9:30:00 AM

Recommendation	No. of Fill Units	%	Fill Units
Recommended for No Further Action*	12	54%	ES177 (TU133), ES180 (TU133), ES181 (TU147), ES185 (TU139), ES186 (TU139), ES188 (TU143), ES221 (TU148), ES222 (TU148), ES226 (TU148) , ES228 (TU150), ES233 (TU150), ES272 (TU168)
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	14	46%	ES178 (TU133), ES179 (TU146), ES183 (TU146), ES184 (TU147), ES187 (TU139), ES189 (TU147), ES190 (TU139), ES198 (TU139), ES200 (TU140), ES224 (TU140), ES227 (TU146), ES232 (TU150), ES267 (TU164), ES276 (TU168)

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.



Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel UC-1

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 75 150 300 Feet

1 inch = 150 feet

Figure 4-6
Parcel UC-1 Fill Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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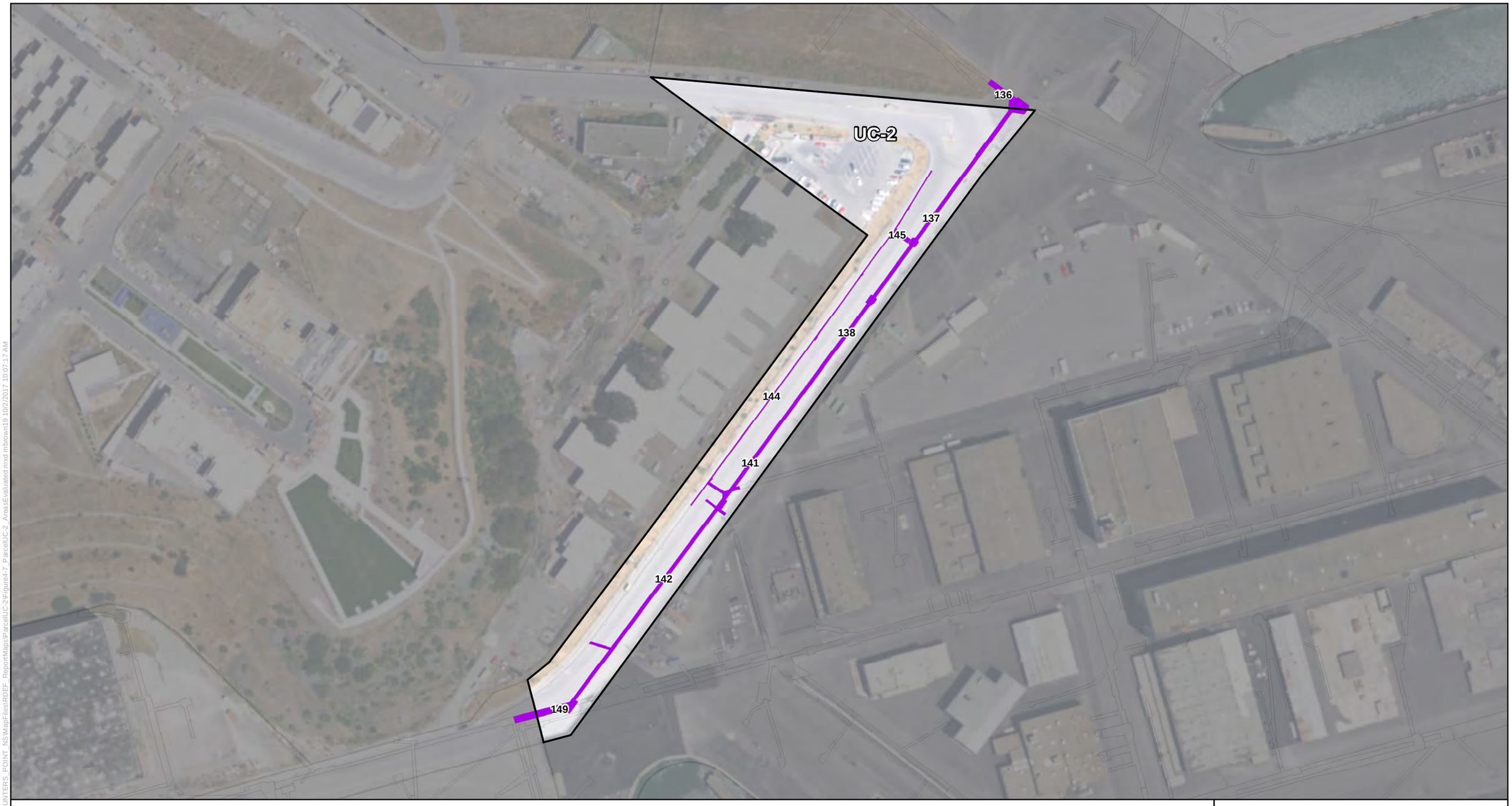

Legend:

- Trench and Fill Unit
- Parcel UC-2

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 75 150 300 Feet

1 inch = 150 feet

Figure 4-7
Areas Evaluated in Parcel UC-2
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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Recommendation	No. of Trenches	%	Trench Units
Recommended for No Further Action*		0%	
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	8	100%	TU136, TU137, TU138, TU141, TU142, TU144, TU145, TU149

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.

UC-2

136

137

145

138

144

141

142

149

Legend:

- Recommended for Confirmation Sampling
- Parcel UC-2

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 75 150 300 Feet

1 inch = 150 feet

Figure 4-8
Parcel UC-2 Trench Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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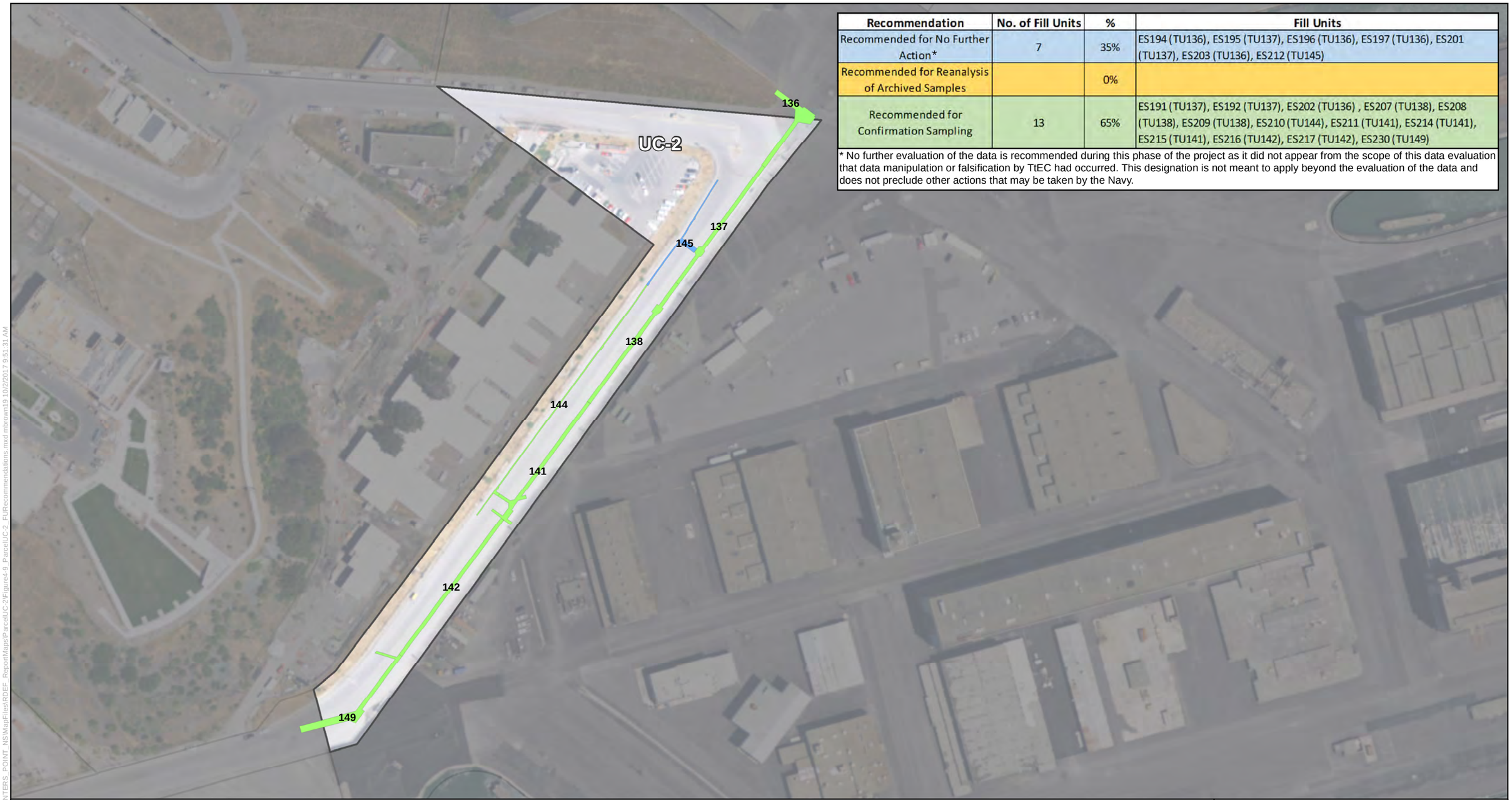
Recommendation	No. of Fill Units	%	Fill Units
Recommended for No Further Action*	7	35%	ES194 (TU136), ES195 (TU137), ES196 (TU136), ES197 (TU136), ES201 (TU137), ES203 (TU136), ES212 (TU145)
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	13	65%	ES191 (TU137), ES192 (TU137), ES202 (TU136) , ES207 (TU138), ES208 (TU138), ES209 (TU138), ES210 (TU144), ES211 (TU141), ES214 (TU141), ES215 (TU141), ES216 (TU142), ES217 (TU142), ES230 (TU149)

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.



Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel UC-2

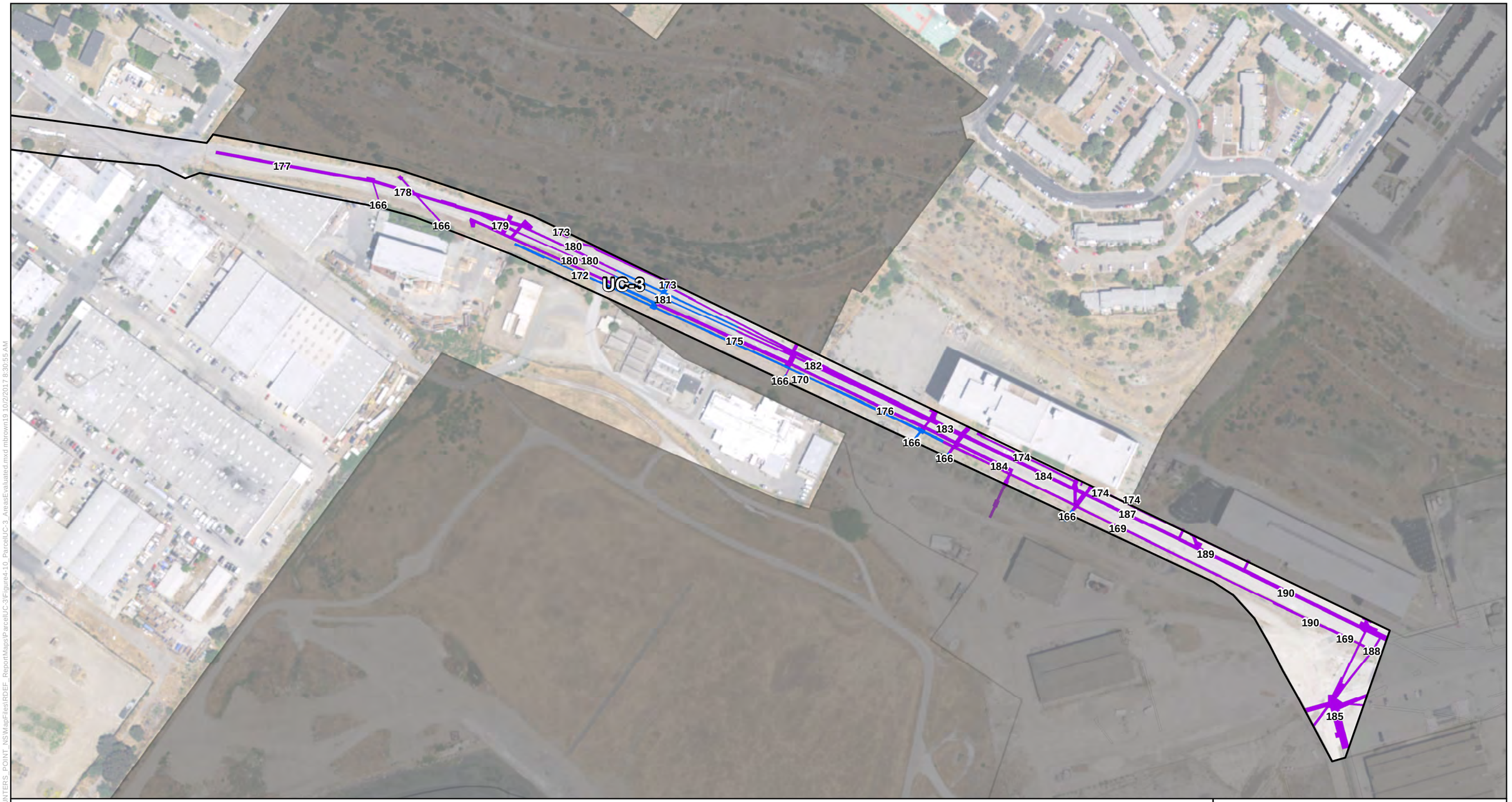
BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 75 150 300 Feet

1 inch = 150 feet

Figure 4-9
Parcel UC-2 Fill Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California



Legend:

- Trench Unit
- Trench and Fill Unit
- Parcel UC-3

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 100 200 400 Feet

1 inch = 200 feet

Figure 4-10
Areas Evaluated in Parcel UC-3
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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Recommendation	No. of Trenches	%	Trench Units
Recommended for No Further Action*	16	76%	TU170, TU172, TU173, TU174, TU176, TU178, TU179, TU180, TU181, TU182, TU183, TU184, TU185, TU187, TU188, TU189
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	5	24%	TU166, TU169, TU175, TU177, TU190

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.

177 178 166 166 179 173 180 180180 172 UC-3 173 181 175 182 166 170 176 183 166 166 174 184 184 174 174 166 187 169 189 190 190 169 188 185

Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel UC-3

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

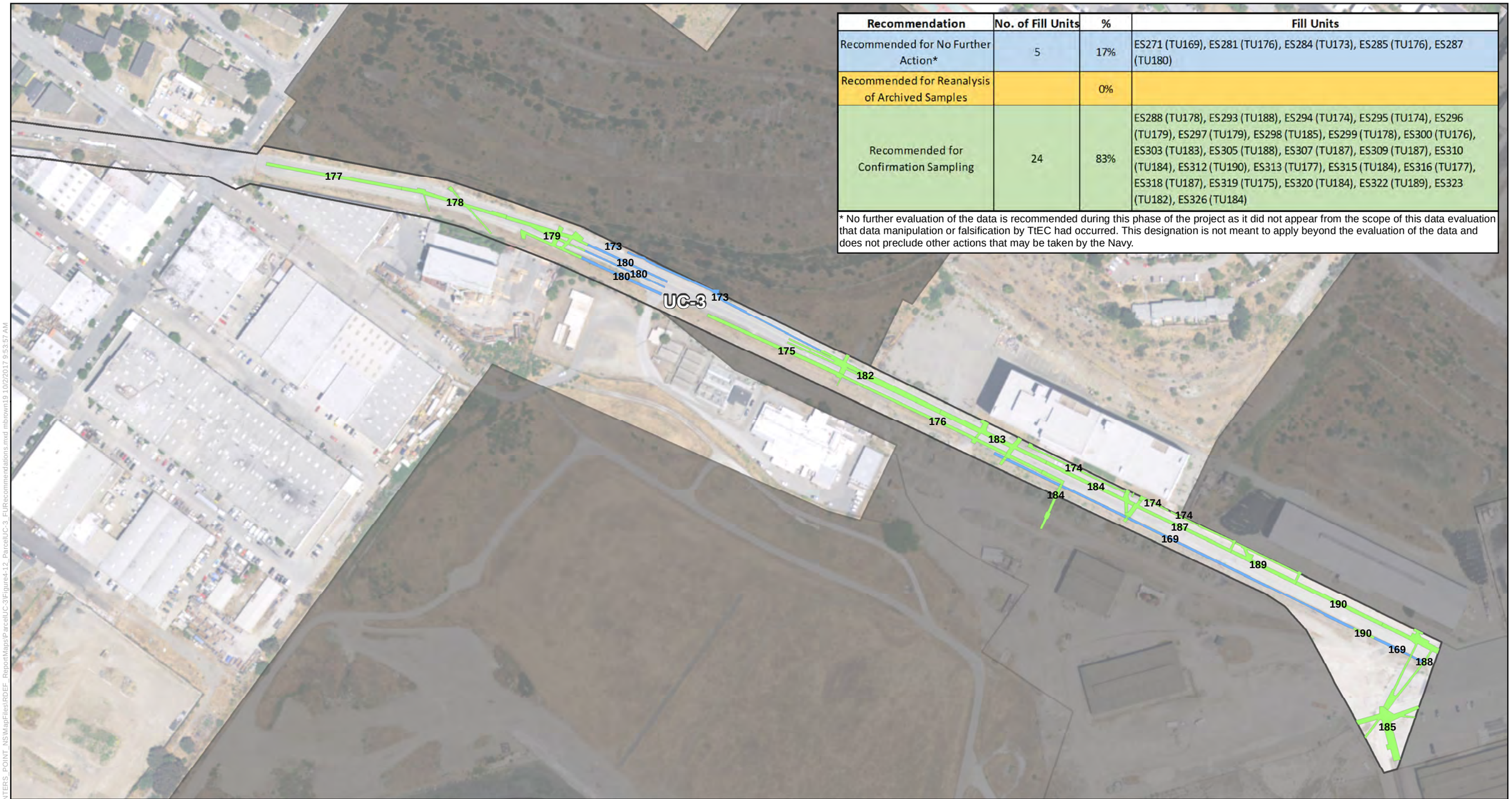
0 100 200 400 Feet

1 inch = 200 feet

Figure 4-11
Parcel UC-3 Trench Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

Recommendation	No. of Fill Units	%	Fill Units
Recommended for No Further Action*	5	17%	ES271 (TU169), ES281 (TU176), ES284 (TU173), ES285 (TU176), ES287 (TU180)
Recommended for Reanalysis of Archived Samples		0%	
Recommended for Confirmation Sampling	24	83%	ES288 (TU178), ES293 (TU188), ES294 (TU174), ES295 (TU174), ES296 (TU179), ES297 (TU179), ES298 (TU185), ES299 (TU178), ES300 (TU176), ES303 (TU183), ES305 (TU188), ES307 (TU187), ES309 (TU187), ES310 (TU184), ES312 (TU190), ES313 (TU177), ES315 (TU184), ES316 (TU177), ES318 (TU187), ES319 (TU175), ES320 (TU184), ES322 (TU189), ES323 (TU182), ES326 (TU184)

* No further evaluation of the data is recommended during this phase of the project as it did not appear from the scope of this data evaluation that data manipulation or falsification by TtEC had occurred. This designation is not meant to apply beyond the evaluation of the data and does not preclude other actions that may be taken by the Navy.



Legend:

- Recommended for No Further Action
- Recommended for Confirmation Sampling
- Parcel UC-3

BASE MAP SOURCE:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 100 200 400 Feet

1 inch = 200 feet

Figure 4-12
Parcel UC-3 Fill Unit Recommendations
Radiological Data Evaluation Findings Report
Former Hunters Point Naval Shipyard
San Francisco, California

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SECTION 5

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Appendix A
K-S Test Results

Appendix A (K-S Test Results) is provided as a separate PDF on the enclosed CD-ROM.

Appendix B
Example Data Evaluation Form

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Section I: Reason For Evaluation (Summary of Flagged Data):										
1) K-S Test: Pass/Fail?									Pass ☐	Fail ☐
Units Evaluation Flags										
Ac-228	Bi-212	Bi-214	Cs-137	K-40	Pb-212	Pb-214	Ra-226	Total		
Days Evaluation Flags										
Ac-228	Bi-212	Bi-214	Cs-137	K-40	Pb-212	Pb-214	Ra-226	Total		
2) Logic Tests: Pass/Fail?									Pass ☐	Fail ☐
Logic Test 1: Were FSS samples collected on the same day? **Observation:**									Yes ☐	No ☐
Logic Test 2: Were FSS samples collected on the same day or after confirmatory/biased samples were collected? **Observation:**									Yes ☐	No ☐
Logic Test 3: Were samples collected before they were counted? **Observation:**									Yes ☐	No ☐
Logic Test 4: Were all FSS samples analyzed within 2 working days? **Observation:**									Yes ☐	No ☐
Logic Test 5: Were samples counted within 2 weeks of sample collection? **Observation:**									Yes ☐	No ☐
Logic Test 6: Is the mass of the sample reported by the onsite lab the same as the mass reported by the offsite lab? **Observation:**									Yes ☐	No ☐
3) Time Series Plots: Pass/Fail?									Pass ☐	Fail ☐
Bi-214	Anomalies or unusual trends identified?								No ☐	Yes ☐
	Notes:									
Ac-228	Anomalies or unusual trends identified?								No ☐	Yes ☐
	Notes:									
K-40	Anomalies or unusual trends identified?								No ☐	Yes ☐
	Notes:									
4) Historically Significant Site Location: Yes/No?									No ☐	Yes ☐
Was a known radiation cleanup performed at (or near) this site? If yes, where?									No ☐	Yes ☐
Is the sewer line connected to or downstream from a radiologically-impacted building? If yes, which building?									No ☐	Yes ☐
5) Allegation: Yes/No?									No ☐	Yes ☐
If yes, description:										

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Section II: Evaluations Performed			
1) Other Statistics Results		Pass ☐	Fail ☐
Box Plots	Anomalies or unusual trends identified?	No ☐	Yes ☐
	Notes:		
Normal Quantile Plots	Anomalies or unusual trends identified?	No ☐	Yes ☐
	Notes:		
2) Additional Database Review Performed?		No ☐	Yes ☐
Review objectives:			
Observations:			
3) Adjacent Survey/Trench Unit Review		Pass ☐	Fail ☐
List of Adjacent Units:			
Was a review of adjacent unit's data performed?			
Anomalies or unusual trends identified?		No ☐	Yes ☐
Notes:			
4) SUPR or FSSR Review Performed?			
Summary of Excavation Survey / Sampling Activities			
Gamma Static Data Observations:			
Gamma Scan Data Observations:			
List of Excavation Survey / Overburden Units Used for Backfill			
Onsite / Offsite Lab Data Comparison:			
Scan / Static Surveyor Name:			
Sampler / Surveyor Name:			
5) RACR or CSR Review Performed?			
List of Excavation Survey / Overburden Units Created from Excavation:			

Section III: Conclusions and Recommendations
Summary of Findings:

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Section III: Conclusions and Recommendations			
☐ **No Further Action**	☐ **Reanalyze Archived Samples**	☐ **Confirmation Sampling**	☐ **Physical Inspection of Archived Samples**
☐ **Other Recommendations:**			
Additional Information Required:			

Completed by: _____ **Date:** _____

Reviewed by: _____ **Date:** _____

Approved by: _____ **Date:** _____

Acronyms:

Ac	Actinium (e.g., Ac-228)
B	Former Building (or other site) Surface Soil Survey Unit
Bi	Bismuth (e.g., Bi-214)
Cs	Cesium (e.g., Cs-137)
CSR	Construction Summary Report
ES	Excavation Survey Unit
FSS	Final Status Survey
FSSR	Final Status Survey Report
K	Potassium (e.g., K-40)
OB	Overburden Unit
Pb	Lead (e.g., Pb-212)
Ra	Radium (e.g., Ra-226)
RACR	Remedial Action Completion Report
S	Sewer or Storm Drain Removal Survey Unit
SUPR	Survey Unit Progress Report
TU	Trench Unit

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Time-Series Plots

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Box Plots

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Normal Quantile Plots

Data Evaluation Documentation and Findings

Parcel:		Unit:	

Map

Appendix C
Data Evaluation Forms

Appendix C (Data Evaluation Forms) is provided as a separate PDF on the enclosed CD-ROM.